```
********************************************************************************************************
************************************   DIRICHLET BOUNDARY CONDITIONS   *********************************
********************************************************************************************************

 GRID SIZE: Nx = 1, Ny = 3
RESOLUTION: dx = 1, dy = 2
     BC's: DIRICHLET

DX =

[ 0   0   0   ]
[ 0   0   0   ]
[ 0   0   0   ]


D2X =

[ 0   0   0   ]
[ 0   0   0   ]
[ 0   0   0   ]


DY =

[     0    0.25       0  ]
[ -0.25       0    0.25  ]
[     0   -0.25       0  ]


D2Y =

[ -0.5  0.25     0  ]
[ 0.25  -0.5  0.25  ]
[    0  0.25  -0.5  ]

-------------------------------------------------------------------------------------------------------

 GRID SIZE: Nx = 1, Ny = 5
RESOLUTION: dx = 1, dy = 2
     BC's: DIRICHLET

DX =

[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]


D2X =

[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]


DY =

[     0   0.25      0      0      0  ]
[ -0.25      0   0.25      0      0  ]
[     0  -0.25      0   0.25      0  ]
[     0      0  -0.25      0   0.25  ]
[     0      0      0  -0.25      0  ]


D2Y =

[ -0.5  0.25     0     0     0  ]
[ 0.25  -0.5  0.25     0     0  ]
[    0  0.25  -0.5  0.25     0  ]
[    0     0  0.25  -0.5  0.25  ]
[    0     0     0  0.25  -0.5  ]

-------------------------------------------------------------------------------------------------------

 GRID SIZE: Nx = 3, Ny = 1
RESOLUTION: dx = 1, dy = 2
     BC's: DIRICHLET

DX =

[    0   0.5      0  ]
[ -0.5     0    0.5  ]
[    0  -0.5      0  ]


D2X =

[ -2   1   0  ]
[  1  -2   1  ]
[  0   1  -2  ]
```

```
DY =

[ 0  0  0 ]
[ 0  0  0 ]
[ 0  0  0 ]


D2Y =

[ 0  0  0 ]
[ 0  0  0 ]
[ 0  0  0 ]
```

```
 GRID SIZE: Nx = 5, Ny = 1
RESOLUTION: dx = 1, dy = 2
      BC's: DIRICHLET

DX =

[    0   0.5     0     0     0 ]
[ -0.5     0   0.5     0     0 ]
[    0  -0.5     0   0.5     0 ]
[    0     0  -0.5     0   0.5 ]
[    0     0     0  -0.5     0 ]


D2X =

[ -2   1   0   0   0 ]
[  1  -2   1   0   0 ]
[  0   1  -2   1   0 ]
[  0   0   1  -2   1 ]
[  0   0   0   1  -2 ]


DY =

[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]


D2Y =

[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
```

```
 GRID SIZE: Nx = 3, Ny = 3
RESOLUTION: dx = 1, dy = 2
      BC's: DIRICHLET

DX =

[    0   0.5     0     0     0     0     0     0     0 ]
[ -0.5     0   0.5     0     0     0     0     0     0 ]
[    0  -0.5     0     0     0     0     0     0     0 ]
[    0     0     0     0   0.5     0     0     0     0 ]
[    0     0     0  -0.5     0   0.5     0     0     0 ]
[    0     0     0     0  -0.5     0     0     0     0 ]
[    0     0     0     0     0     0     0   0.5     0 ]
[    0     0     0     0     0     0  -0.5     0   0.5 ]
[    0     0     0     0     0     0     0  -0.5     0 ]


D2X =

[ -2   1   0   0   0   0   0   0   0 ]
[  1  -2   1   0   0   0   0   0   0 ]
[  0   1  -2   0   0   0   0   0   0 ]
[  0   0   0  -2   1   0   0   0   0 ]
[  0   0   0   1  -2   1   0   0   0 ]
[  0   0   0   0   1  -2   0   0   0 ]
[  0   0   0   0   0   0  -2   1   0 ]
[  0   0   0   0   0   0   1  -2   1 ]
[  0   0   0   0   0   0   0   1  -2 ]
```

```
DY =

[     0       0       0   0.25      0       0       0       0       0 ]
[     0       0       0       0   0.25      0       0       0       0 ]
[     0       0       0       0       0   0.25      0       0       0 ]
[ -0.25       0       0       0       0       0   0.25      0       0 ]
[     0   -0.25       0       0       0       0       0   0.25      0 ]
[     0       0   -0.25       0       0       0       0       0   0.25 ]
[     0       0       0   -0.25      0       0       0       0       0 ]
[     0       0       0       0   -0.25      0       0       0       0 ]
[     0       0       0       0       0   -0.25      0       0       0 ]


D2Y =

[ -0.5      0       0   0.25      0       0       0       0       0 ]
[    0   -0.5      0       0   0.25      0       0       0       0 ]
[    0      0   -0.5      0       0   0.25      0       0       0 ]
[ 0.25      0       0   -0.5      0       0   0.25      0       0 ]
[    0   0.25      0       0   -0.5      0       0   0.25      0 ]
[    0      0   0.25      0       0   -0.5      0       0   0.25 ]
[    0      0       0   0.25      0       0   -0.5      0       0 ]
[    0      0       0       0   0.25      0       0   -0.5      0 ]
[    0      0       0       0       0   0.25      0       0   -0.5 ]

-------------------------------------------------------------------------------------------------------

 GRID SIZE: Nx = 3, Ny = 5
RESOLUTION: dx = 1, dy = 2
       BC's: DIRICHLET

DX =

[    0   0.5      0       0       0       0       0       0       0       0       0       0       0       0       0 ]
[ -0.5      0   0.5      0       0       0       0       0       0       0       0       0       0       0       0 ]
[    0   -0.5      0       0       0       0       0       0       0       0       0       0       0       0       0 ]
[    0      0       0       0   0.5      0       0       0       0       0       0       0       0       0       0 ]
[    0      0       0   -0.5      0   0.5      0       0       0       0       0       0       0       0       0 ]
[    0      0       0       0   -0.5      0       0       0       0       0       0       0       0       0       0 ]
[    0      0       0       0       0       0       0   0.5      0       0       0       0       0       0       0 ]
[    0      0       0       0       0       0   -0.5      0   0.5      0       0       0       0       0       0 ]
[    0      0       0       0       0       0       0   -0.5      0       0       0       0       0       0       0 ]
[    0      0       0       0       0       0       0       0       0       0   0.5      0       0       0       0 ]
[    0      0       0       0       0       0       0       0       0   -0.5      0   0.5      0       0       0 ]
[    0      0       0       0       0       0       0       0       0       0   -0.5      0       0       0       0 ]
[    0      0       0       0       0       0       0       0       0       0       0       0       0   0.5      0 ]
[    0      0       0       0       0       0       0       0       0       0       0       0   -0.5      0   0.5 ]
[    0      0       0       0       0       0       0       0       0       0       0       0       0   -0.5      0 ]


D2X =

[ -2   1   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  1  -2   1   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   1  -2   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0  -2   1   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   1  -2   1   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   1  -2   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0  -2   1   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   1  -2   1   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   1  -2   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0  -2   1   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   1  -2   1   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   1  -2   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0  -2   1   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   1  -2   1 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   1  -2 ]


DY =

[    0      0       0   0.25      0       0       0       0       0       0       0       0       0       0       0 ]
[    0      0       0       0   0.25      0       0       0       0       0       0       0       0       0       0 ]
[    0      0       0       0       0   0.25      0       0       0       0       0       0       0       0       0 ]
[ -0.25      0       0       0       0       0   0.25      0       0       0       0       0       0       0       0 ]
[    0   -0.25      0       0       0       0       0   0.25      0       0       0       0       0       0       0 ]
[    0      0   -0.25      0       0       0       0       0   0.25      0       0       0       0       0       0 ]
[    0      0       0   -0.25      0       0       0       0       0   0.25      0       0       0       0       0 ]
[    0      0       0       0   -0.25      0       0       0       0       0   0.25      0       0       0       0 ]
[    0      0       0       0       0   -0.25      0       0       0       0       0   0.25      0       0       0 ]
[    0      0       0       0       0       0   -0.25      0       0       0       0       0   0.25      0       0 ]
[    0      0       0       0       0       0       0   -0.25      0       0       0       0       0   0.25      0 ]
[    0      0       0       0       0       0       0       0   -0.25      0       0       0       0       0   0.25 ]
[    0      0       0       0       0       0       0       0       0   -0.25      0       0       0       0       0 ]
[    0      0       0       0       0       0       0       0       0       0   -0.25      0       0       0       0 ]
[    0      0       0       0       0       0       0       0       0       0       0   -0.25      0       0       0 ]
```

D2Y =

```
[ -0.5     0     0  0.25     0     0     0     0     0     0     0     0     0     0     0 ]
[    0  -0.5     0     0  0.25     0     0     0     0     0     0     0     0     0     0 ]
[    0     0  -0.5     0     0  0.25     0     0     0     0     0     0     0     0     0 ]
[ 0.25     0     0  -0.5     0     0  0.25     0     0     0     0     0     0     0     0 ]
[    0  0.25     0     0  -0.5     0     0  0.25     0     0     0     0     0     0     0 ]
[    0     0  0.25     0     0  -0.5     0     0  0.25     0     0     0     0     0     0 ]
[    0     0     0  0.25     0     0  -0.5     0     0  0.25     0     0     0     0     0 ]
[    0     0     0     0  0.25     0     0  -0.5     0     0  0.25     0     0     0     0 ]
[    0     0     0     0     0  0.25     0     0  -0.5     0     0  0.25     0     0     0 ]
[    0     0     0     0     0     0  0.25     0     0  -0.5     0     0  0.25     0     0 ]
[    0     0     0     0     0     0     0  0.25     0     0  -0.5     0     0  0.25     0 ]
[    0     0     0     0     0     0     0     0  0.25     0     0  -0.5     0     0  0.25 ]
[    0     0     0     0     0     0     0     0     0  0.25     0     0  -0.5     0     0 ]
[    0     0     0     0     0     0     0     0     0     0  0.25     0     0  -0.5     0 ]
[    0     0     0     0     0     0     0     0     0     0     0  0.25     0     0  -0.5 ]
```

```
 GRID SIZE: Nx = 5, Ny = 3
RESOLUTION: dx = 1, dy = 2
      BC's: DIRICHLET
```

DX =

```
[    0   0.5     0     0     0     0     0     0     0     0     0     0     0     0     0 ]
[ -0.5     0   0.5     0     0     0     0     0     0     0     0     0     0     0     0 ]
[    0  -0.5     0   0.5     0     0     0     0     0     0     0     0     0     0     0 ]
[    0     0  -0.5     0   0.5     0     0     0     0     0     0     0     0     0     0 ]
[    0     0     0  -0.5     0     0     0     0     0     0     0     0     0     0     0 ]
[    0     0     0     0     0     0   0.5     0     0     0     0     0     0     0     0 ]
[    0     0     0     0     0  -0.5     0   0.5     0     0     0     0     0     0     0 ]
[    0     0     0     0     0     0  -0.5     0   0.5     0     0     0     0     0     0 ]
[    0     0     0     0     0     0     0  -0.5     0   0.5     0     0     0     0     0 ]
[    0     0     0     0     0     0     0     0  -0.5     0     0     0     0     0     0 ]
[    0     0     0     0     0     0     0     0     0     0     0   0.5     0     0     0 ]
[    0     0     0     0     0     0     0     0     0     0  -0.5     0   0.5     0     0 ]
[    0     0     0     0     0     0     0     0     0     0     0  -0.5     0   0.5     0 ]
[    0     0     0     0     0     0     0     0     0     0     0     0  -0.5     0   0.5 ]
[    0     0     0     0     0     0     0     0     0     0     0     0     0  -0.5     0 ]
```

D2X =

```
[ -2   1   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  1  -2   1   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   1  -2   1   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   1  -2   1   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   1  -2   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0  -2   1   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   1  -2   1   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   1  -2   1   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   1  -2   1   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   1  -2   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0  -2   1   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   1  -2   1   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   1  -2   1   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   1  -2   1 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   1  -2 ]
```

DY =

```
[     0      0      0      0      0   0.25      0      0      0      0      0      0      0      0      0 ]
[     0      0      0      0      0      0   0.25      0      0      0      0      0      0      0      0 ]
[     0      0      0      0      0      0      0   0.25      0      0      0      0      0      0      0 ]
[     0      0      0      0      0      0      0      0   0.25      0      0      0      0      0      0 ]
[     0      0      0      0      0      0      0      0      0   0.25      0      0      0      0      0 ]
[ -0.25      0      0      0      0      0      0      0      0      0   0.25      0      0      0      0 ]
[     0  -0.25      0      0      0      0      0      0      0      0      0   0.25      0      0      0 ]
[     0      0  -0.25      0      0      0      0      0      0      0      0      0   0.25      0      0 ]
[     0      0      0  -0.25      0      0      0      0      0      0      0      0      0   0.25      0 ]
[     0      0      0      0  -0.25      0      0      0      0      0      0      0      0      0   0.25 ]
[     0      0      0      0      0  -0.25      0      0      0      0      0      0      0      0      0 ]
[     0      0      0      0      0      0  -0.25      0      0      0      0      0      0      0      0 ]
[     0      0      0      0      0      0      0  -0.25      0      0      0      0      0      0      0 ]
[     0      0      0      0      0      0      0      0  -0.25      0      0      0      0      0      0 ]
[     0      0      0      0      0      0      0      0      0  -0.25      0      0      0      0      0 ]
```

```
D2Y =

[ -0.5    0     0     0     0  0.25    0     0     0     0     0     0     0     0     0 ]
[    0  -0.5    0     0     0     0  0.25    0     0     0     0     0     0     0     0 ]
[    0     0  -0.5    0     0     0     0  0.25    0     0     0     0     0     0     0 ]
[    0     0     0  -0.5    0     0     0     0  0.25    0     0     0     0     0     0 ]
[    0     0     0     0  -0.5    0     0     0     0  0.25    0     0     0     0     0 ]
[ 0.25    0     0     0     0  -0.5    0     0     0     0  0.25    0     0     0     0 ]
[    0  0.25    0     0     0     0  -0.5    0     0     0     0  0.25    0     0     0 ]
[    0     0  0.25    0     0     0     0  -0.5    0     0     0     0  0.25    0     0 ]
[    0     0     0  0.25    0     0     0     0  -0.5    0     0     0     0  0.25    0 ]
[    0     0     0     0  0.25    0     0     0     0  -0.5    0     0     0     0  0.25 ]
[    0     0     0     0     0  0.25    0     0     0     0  -0.5    0     0     0     0 ]
[    0     0     0     0     0     0  0.25    0     0     0     0  -0.5    0     0     0 ]
[    0     0     0     0     0     0     0  0.25    0     0     0     0  -0.5    0     0 ]
[    0     0     0     0     0     0     0     0  0.25    0     0     0     0  -0.5    0 ]
[    0     0     0     0     0     0     0     0     0  0.25    0     0     0     0  -0.5 ]
```

```
 GRID SIZE: Nx = 4, Ny = 4
RESOLUTION: dx = 1, dy = 2
      BC's: DIRICHLET

DX =

[    0   0.5    0     0     0     0     0     0     0     0     0     0     0     0     0     0 ]
[ -0.5    0   0.5    0     0     0     0     0     0     0     0     0     0     0     0     0 ]
[    0  -0.5    0   0.5    0     0     0     0     0     0     0     0     0     0     0     0 ]
[    0     0  -0.5    0     0     0     0     0     0     0     0     0     0     0     0     0 ]
[    0     0     0     0     0   0.5    0     0     0     0     0     0     0     0     0     0 ]
[    0     0     0     0  -0.5    0   0.5    0     0     0     0     0     0     0     0     0 ]
[    0     0     0     0     0  -0.5    0   0.5    0     0     0     0     0     0     0     0 ]
[    0     0     0     0     0     0  -0.5    0     0     0     0     0     0     0     0     0 ]
[    0     0     0     0     0     0     0     0     0   0.5    0     0     0     0     0     0 ]
[    0     0     0     0     0     0     0     0  -0.5    0   0.5    0     0     0     0     0 ]
[    0     0     0     0     0     0     0     0     0  -0.5    0   0.5    0     0     0     0 ]
[    0     0     0     0     0     0     0     0     0     0  -0.5    0     0     0     0     0 ]
[    0     0     0     0     0     0     0     0     0     0     0     0     0   0.5    0     0 ]
[    0     0     0     0     0     0     0     0     0     0     0     0  -0.5    0   0.5    0 ]
[    0     0     0     0     0     0     0     0     0     0     0     0     0  -0.5    0   0.5 ]
[    0     0     0     0     0     0     0     0     0     0     0     0     0     0  -0.5    0 ]
```

```
D2X =

[ -2   1   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  1  -2   1   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   1  -2   1   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   1  -2   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0  -2   1   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   1  -2   1   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   1  -2   1   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   1  -2   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0  -2   1   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   1  -2   1   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   1  -2   1   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   1  -2   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0  -2   1   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   1  -2   1   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   1  -2   1 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   1  -2 ]
```

```
DY =

[    0      0      0      0    0.25    0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0    0.25    0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0    0.25    0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0    0.25    0      0      0      0      0      0      0      0 ]
[ -0.25    0      0      0      0      0      0      0    0.25    0      0      0      0      0      0      0 ]
[    0   -0.25    0      0      0      0      0      0      0    0.25    0      0      0      0      0      0 ]
[    0      0   -0.25    0      0      0      0      0      0      0    0.25    0      0      0      0      0 ]
[    0      0      0   -0.25    0      0      0      0      0      0      0    0.25    0      0      0      0 ]
[    0      0      0      0   -0.25    0      0      0      0      0      0      0    0.25    0      0      0 ]
[    0      0      0      0      0   -0.25    0      0      0      0      0      0      0    0.25    0      0 ]
[    0      0      0      0      0      0   -0.25    0      0      0      0      0      0      0    0.25    0 ]
[    0      0      0      0      0      0      0   -0.25    0      0      0      0      0      0      0    0.25 ]
[    0      0      0      0      0      0      0      0   -0.25    0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0   -0.25    0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0   -0.25    0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0   -0.25    0      0      0      0 ]
```

```
D2Y =

[ -0.5     0      0      0   0.25     0      0      0      0      0      0      0      0      0      0      0 ]
[    0  -0.5      0      0      0   0.25     0      0      0      0      0      0      0      0      0      0 ]
[    0     0   -0.5      0      0      0   0.25     0      0      0      0      0      0      0      0      0 ]
[    0     0      0   -0.5      0      0      0   0.25     0      0      0      0      0      0      0      0 ]
[ 0.25     0      0      0   -0.5      0      0      0   0.25     0      0      0      0      0      0      0 ]
[    0  0.25      0      0      0   -0.5      0      0      0   0.25     0      0      0      0      0      0 ]
[    0     0   0.25      0      0      0   -0.5      0      0      0   0.25     0      0      0      0      0 ]
[    0     0      0   0.25      0      0      0   -0.5      0      0      0   0.25     0      0      0      0 ]
[    0     0      0      0   0.25      0      0      0   -0.5      0      0      0   0.25     0      0      0 ]
[    0     0      0      0      0   0.25      0      0      0   -0.5      0      0      0   0.25     0      0 ]
[    0     0      0      0      0      0   0.25      0      0      0   -0.5      0      0      0   0.25     0 ]
[    0     0      0      0      0      0      0   0.25      0      0      0   -0.5      0      0      0   0.25 ]
[    0     0      0      0      0      0      0      0   0.25      0      0      0   -0.5      0      0      0 ]
[    0     0      0      0      0      0      0      0      0   0.25      0      0      0   -0.5      0      0 ]
[    0     0      0      0      0      0      0      0      0      0   0.25      0      0      0   -0.5      0 ]
[    0     0      0      0      0      0      0      0      0      0      0   0.25      0      0      0   -0.5 ]
```

```
************************************************************************************************************
********     PERIODIC BOUNDARY CONDITIONS     *************************************************************
************************************************************************************************************
```

```
 GRID SIZE: Nx = 1, Ny = 3
RESOLUTION: dx = 1, dy = 2
      BC's: PERIODIC

DX =

[ 0  0  0 ]
[ 0  0  0 ]
[ 0  0  0 ]


D2X =

[ 0  0  0 ]
[ 0  0  0 ]
[ 0  0  0 ]


DY =

[     0   0.25  -0.25 ]
[ -0.25      0   0.25 ]
[  0.25  -0.25      0 ]


D2Y =

[ -0.5  0.25   0.25 ]
[ 0.25  -0.5   0.25 ]
[ 0.25  0.25   -0.5 ]
```

```
 GRID SIZE: Nx = 1, Ny = 5
RESOLUTION: dx = 1, dy = 2
      BC's: PERIODIC

DX =

[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]


D2X =

[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]


DY =

[     0   0.25      0      0  -0.25 ]
[ -0.25      0   0.25      0      0 ]
[     0  -0.25      0   0.25      0 ]
[     0      0  -0.25      0   0.25 ]
[  0.25      0      0  -0.25      0 ]


D2Y =

[ -0.5  0.25      0      0   0.25 ]
[ 0.25  -0.5   0.25      0      0 ]
[    0  0.25   -0.5   0.25      0 ]
[    0     0   0.25   -0.5   0.25 ]
[ 0.25     0      0   0.25   -0.5 ]
```

```
--------------------------------------------------------------------------------------------------
 GRID SIZE: Nx = 3, Ny = 1
RESOLUTION: dx = 1, dy = 2
      BC's: PERIODIC

DX =

[    0   0.5  -0.5  ]
[ -0.5     0   0.5  ]
[  0.5  -0.5     0  ]


D2X =

[ -2   1   1  ]
[  1  -2   1  ]
[  1   1  -2  ]


DY =

[ 0  0  0 ]
[ 0  0  0 ]
[ 0  0  0 ]


D2Y =

[ 0  0  0 ]
[ 0  0  0 ]
[ 0  0  0 ]

--------------------------------------------------------------------------------------------------
 GRID SIZE: Nx = 5, Ny = 1
RESOLUTION: dx = 1, dy = 2
      BC's: PERIODIC

DX =

[    0   0.5     0     0  -0.5  ]
[ -0.5     0   0.5     0     0  ]
[    0  -0.5     0   0.5     0  ]
[    0     0  -0.5     0   0.5  ]
[  0.5     0     0  -0.5     0  ]


D2X =

[ -2   1   0   0   1  ]
[  1  -2   1   0   0  ]
[  0   1  -2   1   0  ]
[  0   0   1  -2   1  ]
[  1   0   0   1  -2  ]


DY =

[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]


D2Y =

[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]

--------------------------------------------------------------------------------------------------
 GRID SIZE: Nx = 3, Ny = 3
RESOLUTION: dx = 1, dy = 2
      BC's: PERIODIC

DX =

[    0   0.5  -0.5     0     0     0     0     0     0  ]
[ -0.5     0   0.5     0     0     0     0     0     0  ]
[  0.5  -0.5     0     0     0     0     0     0     0  ]
[    0     0     0     0   0.5  -0.5     0     0     0  ]
[    0     0     0  -0.5     0   0.5     0     0     0  ]
[    0     0     0   0.5  -0.5     0     0     0     0  ]
[    0     0     0     0     0     0     0   0.5  -0.5  ]
[    0     0     0     0     0     0  -0.5     0   0.5  ]
[    0     0     0     0     0     0   0.5  -0.5     0  ]
```

```
D2X =

[ -2    1    1    0    0    0    0    0    0  ]
[  1   -2    1    0    0    0    0    0    0  ]
[  1    1   -2    0    0    0    0    0    0  ]
[  0    0    0   -2    1    1    0    0    0  ]
[  0    0    0    1   -2    1    0    0    0  ]
[  0    0    0    1    1   -2    0    0    0  ]
[  0    0    0    0    0    0   -2    1    1  ]
[  0    0    0    0    0    0    1   -2    1  ]
[  0    0    0    0    0    0    1    1   -2  ]


DY =

[     0       0       0    0.25       0       0   -0.25       0       0  ]
[     0       0       0       0    0.25       0       0   -0.25       0  ]
[     0       0       0       0       0    0.25       0       0   -0.25  ]
[ -0.25       0       0       0       0       0    0.25       0       0  ]
[     0   -0.25       0       0       0       0       0    0.25       0  ]
[     0       0   -0.25       0       0       0       0       0    0.25  ]
[  0.25       0       0   -0.25       0       0       0       0       0  ]
[     0    0.25       0       0   -0.25       0       0       0       0  ]
[     0       0    0.25       0       0   -0.25       0       0       0  ]


D2Y =

[ -0.5      0       0    0.25       0       0    0.25       0       0  ]
[    0   -0.5       0       0    0.25       0       0    0.25       0  ]
[    0      0    -0.5       0       0    0.25       0       0    0.25  ]
[ 0.25      0       0    -0.5       0       0    0.25       0       0  ]
[    0   0.25       0       0    -0.5       0       0    0.25       0  ]
[    0      0    0.25       0       0    -0.5       0       0    0.25  ]
[ 0.25      0       0    0.25       0       0    -0.5       0       0  ]
[    0   0.25       0       0    0.25       0       0    -0.5       0  ]
[    0      0    0.25       0       0    0.25       0       0    -0.5  ]

-------------------------------------------------------------------------------------------------------

 GRID SIZE: Nx = 3, Ny = 5
RESOLUTION: dx = 1, dy = 2
      BC's: PERIODIC

DX =

[    0   0.5  -0.5     0     0     0     0     0     0     0     0     0     0     0     0  ]
[ -0.5     0   0.5     0     0     0     0     0     0     0     0     0     0     0     0  ]
[  0.5  -0.5     0     0     0     0     0     0     0     0     0     0     0     0     0  ]
[    0     0     0     0   0.5  -0.5     0     0     0     0     0     0     0     0     0  ]
[    0     0     0  -0.5     0   0.5     0     0     0     0     0     0     0     0     0  ]
[    0     0     0   0.5  -0.5     0     0     0     0     0     0     0     0     0     0  ]
[    0     0     0     0     0     0     0   0.5  -0.5     0     0     0     0     0     0  ]
[    0     0     0     0     0     0  -0.5     0   0.5     0     0     0     0     0     0  ]
[    0     0     0     0     0     0   0.5  -0.5     0     0     0     0     0     0     0  ]
[    0     0     0     0     0     0     0     0     0     0   0.5  -0.5     0     0     0  ]
[    0     0     0     0     0     0     0     0     0  -0.5     0   0.5     0     0     0  ]
[    0     0     0     0     0     0     0     0     0   0.5  -0.5     0     0     0     0  ]
[    0     0     0     0     0     0     0     0     0     0     0     0     0   0.5  -0.5  ]
[    0     0     0     0     0     0     0     0     0     0     0     0  -0.5     0   0.5  ]
[    0     0     0     0     0     0     0     0     0     0     0     0   0.5  -0.5     0  ]


D2X =

[ -2    1    1    0    0    0    0    0    0    0    0    0    0    0    0  ]
[  1   -2    1    0    0    0    0    0    0    0    0    0    0    0    0  ]
[  1    1   -2    0    0    0    0    0    0    0    0    0    0    0    0  ]
[  0    0    0   -2    1    1    0    0    0    0    0    0    0    0    0  ]
[  0    0    0    1   -2    1    0    0    0    0    0    0    0    0    0  ]
[  0    0    0    1    1   -2    0    0    0    0    0    0    0    0    0  ]
[  0    0    0    0    0    0   -2    1    1    0    0    0    0    0    0  ]
[  0    0    0    0    0    0    1   -2    1    0    0    0    0    0    0  ]
[  0    0    0    0    0    0    1    1   -2    0    0    0    0    0    0  ]
[  0    0    0    0    0    0    0    0    0   -2    1    1    0    0    0  ]
[  0    0    0    0    0    0    0    0    0    1   -2    1    0    0    0  ]
[  0    0    0    0    0    0    0    0    0    1    1   -2    0    0    0  ]
[  0    0    0    0    0    0    0    0    0    0    0    0   -2    1    1  ]
[  0    0    0    0    0    0    0    0    0    0    0    0    1   -2    1  ]
[  0    0    0    0    0    0    0    0    0    0    0    0    1    1   -2  ]
```

```
DY =

[     0      0      0   0.25      0      0      0      0      0      0      0      0  -0.25      0      0 ]
[     0      0      0      0   0.25      0      0      0      0      0      0      0      0  -0.25      0 ]
[     0      0      0      0      0   0.25      0      0      0      0      0      0      0      0  -0.25 ]
[ -0.25      0      0      0      0      0   0.25      0      0      0      0      0      0      0      0 ]
[     0  -0.25      0      0      0      0      0   0.25      0      0      0      0      0      0      0 ]
[     0      0  -0.25      0      0      0      0      0   0.25      0      0      0      0      0      0 ]
[     0      0      0  -0.25      0      0      0      0      0   0.25      0      0      0      0      0 ]
[     0      0      0      0  -0.25      0      0      0      0      0   0.25      0      0      0      0 ]
[     0      0      0      0      0  -0.25      0      0      0      0      0   0.25      0      0      0 ]
[     0      0      0      0      0      0  -0.25      0      0      0      0      0   0.25      0      0 ]
[     0      0      0      0      0      0      0  -0.25      0      0      0      0      0   0.25      0 ]
[     0      0      0      0      0      0      0      0  -0.25      0      0      0      0      0   0.25 ]
[  0.25      0      0      0      0      0      0      0      0  -0.25      0      0      0      0      0 ]
[     0   0.25      0      0      0      0      0      0      0      0  -0.25      0      0      0      0 ]
[     0      0   0.25      0      0      0      0      0      0      0      0  -0.25      0      0      0 ]


D2Y =

[ -0.5      0      0   0.25      0      0      0      0      0      0      0      0   0.25      0      0 ]
[    0   -0.5      0      0   0.25      0      0      0      0      0      0      0      0   0.25      0 ]
[    0      0   -0.5      0      0   0.25      0      0      0      0      0      0      0      0   0.25 ]
[ 0.25      0      0   -0.5      0      0   0.25      0      0      0      0      0      0      0      0 ]
[    0   0.25      0      0   -0.5      0      0   0.25      0      0      0      0      0      0      0 ]
[    0      0   0.25      0      0   -0.5      0      0   0.25      0      0      0      0      0      0 ]
[    0      0      0   0.25      0      0   -0.5      0      0   0.25      0      0      0      0      0 ]
[    0      0      0      0   0.25      0      0   -0.5      0      0   0.25      0      0      0      0 ]
[    0      0      0      0      0   0.25      0      0   -0.5      0      0   0.25      0      0      0 ]
[    0      0      0      0      0      0   0.25      0      0   -0.5      0      0   0.25      0      0 ]
[    0      0      0      0      0      0      0   0.25      0      0   -0.5      0      0   0.25      0 ]
[    0      0      0      0      0      0      0      0   0.25      0      0   -0.5      0      0   0.25 ]
[ 0.25      0      0      0      0      0      0      0      0   0.25      0      0   -0.5      0      0 ]
[    0   0.25      0      0      0      0      0      0      0      0   0.25      0      0   -0.5      0 ]
[    0      0   0.25      0      0      0      0      0      0      0      0   0.25      0      0   -0.5 ]
```

```
 GRID SIZE: Nx = 5, Ny = 3
RESOLUTION: dx = 1, dy = 2
      BC's: PERIODIC

DX =

[     0    0.5      0      0   -0.5      0      0      0      0      0      0      0      0      0      0 ]
[  -0.5      0    0.5      0      0      0      0      0      0      0      0      0      0      0      0 ]
[     0   -0.5      0    0.5      0      0      0      0      0      0      0      0      0      0      0 ]
[     0      0   -0.5      0    0.5      0      0      0      0      0      0      0      0      0      0 ]
[   0.5      0      0   -0.5      0      0      0      0      0      0      0      0      0      0      0 ]
[     0      0      0      0      0      0    0.5      0      0   -0.5      0      0      0      0      0 ]
[     0      0      0      0      0   -0.5      0    0.5      0      0      0      0      0      0      0 ]
[     0      0      0      0      0      0   -0.5      0    0.5      0      0      0      0      0      0 ]
[     0      0      0      0      0      0      0   -0.5      0    0.5      0      0      0      0      0 ]
[     0      0      0      0      0    0.5      0      0   -0.5      0      0      0      0      0      0 ]
[     0      0      0      0      0      0      0      0      0      0      0    0.5      0      0   -0.5 ]
[     0      0      0      0      0      0      0      0      0      0   -0.5      0    0.5      0      0 ]
[     0      0      0      0      0      0      0      0      0      0      0   -0.5      0    0.5      0 ]
[     0      0      0      0      0      0      0      0      0      0      0      0   -0.5      0    0.5 ]
[     0      0      0      0      0      0      0      0      0      0    0.5      0      0   -0.5      0 ]


D2X =

[ -2    1    0    0    1    0    0    0    0    0    0    0    0    0    0 ]
[  1   -2    1    0    0    0    0    0    0    0    0    0    0    0    0 ]
[  0    1   -2    1    0    0    0    0    0    0    0    0    0    0    0 ]
[  0    0    1   -2    1    0    0    0    0    0    0    0    0    0    0 ]
[  1    0    0    1   -2    0    0    0    0    0    0    0    0    0    0 ]
[  0    0    0    0    0   -2    1    0    0    1    0    0    0    0    0 ]
[  0    0    0    0    0    1   -2    1    0    0    0    0    0    0    0 ]
[  0    0    0    0    0    0    1   -2    1    0    0    0    0    0    0 ]
[  0    0    0    0    0    0    0    1   -2    1    0    0    0    0    0 ]
[  0    0    0    0    0    1    0    0    1   -2    0    0    0    0    0 ]
[  0    0    0    0    0    0    0    0    0    0   -2    1    0    0    1 ]
[  0    0    0    0    0    0    0    0    0    0    1   -2    1    0    0 ]
[  0    0    0    0    0    0    0    0    0    0    0    1   -2    1    0 ]
[  0    0    0    0    0    0    0    0    0    0    0    0    1   -2    1 ]
[  0    0    0    0    0    0    0    0    0    0    1    0    0    1   -2 ]
```

```
DY =

[      0       0       0       0       0    0.25       0       0       0       0   -0.25       0       0       0       0  ]
[      0       0       0       0       0       0    0.25       0       0       0       0   -0.25       0       0       0  ]
[      0       0       0       0       0       0       0    0.25       0       0       0       0   -0.25       0       0  ]
[      0       0       0       0       0       0       0       0    0.25       0       0       0       0   -0.25       0  ]
[      0       0       0       0       0       0       0       0       0    0.25       0       0       0       0   -0.25 ]
[  -0.25       0       0       0       0       0       0       0       0       0    0.25       0       0       0       0  ]
[      0   -0.25       0       0       0       0       0       0       0       0       0    0.25       0       0       0  ]
[      0       0   -0.25       0       0       0       0       0       0       0       0       0    0.25       0       0  ]
[      0       0       0   -0.25       0       0       0       0       0       0       0       0       0    0.25       0  ]
[      0       0       0       0   -0.25       0       0       0       0       0       0       0       0       0    0.25 ]
[   0.25       0       0       0       0   -0.25       0       0       0       0       0       0       0       0       0  ]
[      0    0.25       0       0       0       0   -0.25       0       0       0       0       0       0       0       0  ]
[      0       0    0.25       0       0       0       0   -0.25       0       0       0       0       0       0       0  ]
[      0       0       0    0.25       0       0       0       0   -0.25       0       0       0       0       0       0  ]
[      0       0       0       0    0.25       0       0       0       0   -0.25       0       0       0       0       0  ]


D2Y =

[  -0.5       0       0       0       0    0.25       0       0       0       0    0.25       0       0       0       0  ]
[     0    -0.5       0       0       0       0    0.25       0       0       0       0    0.25       0       0       0  ]
[     0       0    -0.5       0       0       0       0    0.25       0       0       0       0    0.25       0       0  ]
[     0       0       0    -0.5       0       0       0       0    0.25       0       0       0       0    0.25       0  ]
[     0       0       0       0    -0.5       0       0       0       0    0.25       0       0       0       0    0.25 ]
[  0.25       0       0       0       0    -0.5       0       0       0       0    0.25       0       0       0       0  ]
[     0    0.25       0       0       0       0    -0.5       0       0       0       0    0.25       0       0       0  ]
[     0       0    0.25       0       0       0       0    -0.5       0       0       0       0    0.25       0       0  ]
[     0       0       0    0.25       0       0       0       0    -0.5       0       0       0       0    0.25       0  ]
[     0       0       0       0    0.25       0       0       0       0    -0.5       0       0       0       0    0.25 ]
[  0.25       0       0       0       0    0.25       0       0       0       0    -0.5       0       0       0       0  ]
[     0    0.25       0       0       0       0    0.25       0       0       0       0    -0.5       0       0       0  ]
[     0       0    0.25       0       0       0       0    0.25       0       0       0       0    -0.5       0       0  ]
[     0       0       0    0.25       0       0       0       0    0.25       0       0       0       0    -0.5       0  ]
[     0       0       0       0    0.25       0       0       0       0    0.25       0       0       0       0    -0.5 ]

---------------------------------------------------------------------------------------------------------

 GRID SIZE: Nx = 4, Ny = 4
RESOLUTION: dx = 1, dy = 2
     BC's: PERIODIC

DX =

[     0     0.5       0    -0.5       0       0       0       0       0       0       0       0       0       0       0       0  ]
[  -0.5       0     0.5       0       0       0       0       0       0       0       0       0       0       0       0       0  ]
[     0    -0.5       0     0.5       0       0       0       0       0       0       0       0       0       0       0       0  ]
[   0.5       0    -0.5       0       0       0       0       0       0       0       0       0       0       0       0       0  ]
[     0       0       0       0       0     0.5       0    -0.5       0       0       0       0       0       0       0       0  ]
[     0       0       0       0    -0.5       0     0.5       0       0       0       0       0       0       0       0       0  ]
[     0       0       0       0       0    -0.5       0     0.5       0       0       0       0       0       0       0       0  ]
[     0       0       0       0     0.5       0    -0.5       0       0       0       0       0       0       0       0       0  ]
[     0       0       0       0       0       0       0       0       0     0.5       0    -0.5       0       0       0       0  ]
[     0       0       0       0       0       0       0       0    -0.5       0     0.5       0       0       0       0       0  ]
[     0       0       0       0       0       0       0       0       0    -0.5       0     0.5       0       0       0       0  ]
[     0       0       0       0       0       0       0       0     0.5       0    -0.5       0       0       0       0       0  ]
[     0       0       0       0       0       0       0       0       0       0       0       0       0     0.5       0    -0.5 ]
[     0       0       0       0       0       0       0       0       0       0       0       0    -0.5       0     0.5       0  ]
[     0       0       0       0       0       0       0       0       0       0       0       0       0    -0.5       0     0.5 ]
[     0       0       0       0       0       0       0       0       0       0       0       0     0.5       0    -0.5       0  ]


D2X =

[ -2    1    0    1    0    0    0    0    0    0    0    0    0    0    0    0  ]
[  1   -2    1    0    0    0    0    0    0    0    0    0    0    0    0    0  ]
[  0    1   -2    1    0    0    0    0    0    0    0    0    0    0    0    0  ]
[  1    0    1   -2    0    0    0    0    0    0    0    0    0    0    0    0  ]
[  0    0    0    0   -2    1    0    1    0    0    0    0    0    0    0    0  ]
[  0    0    0    0    1   -2    1    0    0    0    0    0    0    0    0    0  ]
[  0    0    0    0    0    1   -2    1    0    0    0    0    0    0    0    0  ]
[  0    0    0    0    1    0    1   -2    0    0    0    0    0    0    0    0  ]
[  0    0    0    0    0    0    0   -2    1    0    1    0    0    0    0    0  ]
[  0    0    0    0    0    0    0    1   -2    1    0    0    0    0    0    0  ]
[  0    0    0    0    0    0    0    0    1   -2    1    0    0    0    0    0  ]
[  0    0    0    0    0    0    0    0    1    0    1   -2    0    0    0    0  ]
[  0    0    0    0    0    0    0    0    0    0    0    0   -2    1    0    1  ]
[  0    0    0    0    0    0    0    0    0    0    0    0    1   -2    1    0  ]
[  0    0    0    0    0    0    0    0    0    0    0    0    0    1   -2    1  ]
[  0    0    0    0    0    0    0    0    0    0    0    0    1    0    1   -2  ]
```

```
DY =

[    0      0      0      0   0.25     0      0      0      0      0      0      0  -0.25     0      0      0 ]
[    0      0      0      0      0   0.25     0      0      0      0      0      0      0  -0.25     0      0 ]
[    0      0      0      0      0      0   0.25     0      0      0      0      0      0      0  -0.25     0 ]
[    0      0      0      0      0      0      0   0.25     0      0      0      0      0      0      0  -0.25 ]
[ -0.25     0      0      0      0      0      0      0   0.25     0      0      0      0      0      0      0 ]
[    0  -0.25     0      0      0      0      0      0      0   0.25     0      0      0      0      0      0 ]
[    0      0  -0.25     0      0      0      0      0      0      0   0.25     0      0      0      0      0 ]
[    0      0      0  -0.25     0      0      0      0      0      0      0   0.25     0      0      0      0 ]
[    0      0      0      0  -0.25     0      0      0      0      0      0      0   0.25     0      0      0 ]
[    0      0      0      0      0  -0.25     0      0      0      0      0      0      0   0.25     0      0 ]
[    0      0      0      0      0      0  -0.25     0      0      0      0      0      0      0   0.25     0 ]
[    0      0      0      0      0      0      0  -0.25     0      0      0      0      0      0      0   0.25 ]
[  0.25     0      0      0      0      0      0      0  -0.25     0      0      0      0      0      0      0 ]
[    0   0.25     0      0      0      0      0      0      0  -0.25     0      0      0      0      0      0 ]
[    0      0   0.25     0      0      0      0      0      0      0  -0.25     0      0      0      0      0 ]
[    0      0      0   0.25     0      0      0      0      0      0      0  -0.25     0      0      0      0 ]


D2Y =

[ -0.5     0      0      0   0.25     0      0      0      0      0      0      0   0.25     0      0      0 ]
[    0   -0.5     0      0      0   0.25     0      0      0      0      0      0      0   0.25     0      0 ]
[    0      0   -0.5     0      0      0   0.25     0      0      0      0      0      0      0   0.25     0 ]
[    0      0      0   -0.5     0      0      0   0.25     0      0      0      0      0      0      0   0.25 ]
[ 0.25     0      0      0   -0.5     0      0      0   0.25     0      0      0      0      0      0      0 ]
[    0   0.25     0      0      0   -0.5     0      0      0   0.25     0      0      0      0      0      0 ]
[    0      0   0.25     0      0      0   -0.5     0      0      0   0.25     0      0      0      0      0 ]
[    0      0      0   0.25     0      0      0   -0.5     0      0      0   0.25     0      0      0      0 ]
[    0      0      0      0   0.25     0      0      0   -0.5     0      0      0   0.25     0      0      0 ]
[    0      0      0      0      0   0.25     0      0      0   -0.5     0      0      0   0.25     0      0 ]
[    0      0      0      0      0      0   0.25     0      0      0   -0.5     0      0      0   0.25     0 ]
[    0      0      0      0      0      0      0   0.25     0      0      0   -0.5     0      0      0   0.25 ]
[ 0.25     0      0      0      0      0      0      0   0.25     0      0      0   -0.5     0      0      0 ]
[    0   0.25     0      0      0      0      0      0      0   0.25     0      0      0   -0.5     0      0 ]
[    0      0   0.25     0      0      0      0      0      0      0   0.25     0      0      0   -0.5     0 ]
[    0      0      0   0.25     0      0      0      0      0      0      0   0.25     0      0      0   -0.5 ]
```

```
*********************************************************************************************************
***************************************  NEUMANN BOUNDARY CONDITIONS   ***********************************
*********************************************************************************************************

 GRID SIZE: Nx = 1, Ny = 3
RESOLUTION: dx = 1, dy = 2
     BC's: NEUMANN

DX =

[ 0  0  0  ]
[ 0  0  0  ]
[ 0  0  0  ]


D2X =

[ 0  0  0  ]
[ 0  0  0  ]
[ 0  0  0  ]


DY =

[  -0.5    0.5     0  ]
[ -0.25     0   0.25  ]
[    0    -0.5   0.5  ]


D2Y =

[    0      0      0  ]
[ 0.25   -0.5   0.25  ]
[    0      0      0  ]

-------------------------------------------------------------------------------------------------

 GRID SIZE: Nx = 1, Ny = 5
RESOLUTION: dx = 1, dy = 2
     BC's: NEUMANN

DX =

[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
[ 0  0  0  0  0  ]
```

```
D2X =

[ 0   0   0   0   0 ]
[ 0   0   0   0   0 ]
[ 0   0   0   0   0 ]
[ 0   0   0   0   0 ]
[ 0   0   0   0   0 ]


DY =

[  -0.5    0.5      0       0       0 ]
[ -0.25      0    0.25      0       0 ]
[     0  -0.25      0     0.25      0 ]
[     0      0   -0.25      0     0.25 ]
[     0      0       0    -0.5    0.5 ]


D2Y =

[    0     0     0     0     0 ]
[ 0.25  -0.5  0.25     0     0 ]
[    0  0.25  -0.5  0.25     0 ]
[    0     0  0.25  -0.5  0.25 ]
[    0     0     0     0     0 ]
```

```
 GRID SIZE: Nx = 3, Ny = 1
RESOLUTION: dx = 1, dy = 2
      BC's: NEUMANN

DX =

[   -1     1     0 ]
[ -0.5     0   0.5 ]
[    0    -1     1 ]


D2X =

[ 0   0   0 ]
[ 1  -2   1 ]
[ 0   0   0 ]


DY =

[ 0   0   0 ]
[ 0   0   0 ]
[ 0   0   0 ]


D2Y =

[ 0   0   0 ]
[ 0   0   0 ]
[ 0   0   0 ]
```

```
 GRID SIZE: Nx = 5, Ny = 1
RESOLUTION: dx = 1, dy = 2
      BC's: NEUMANN

DX =

[   -1     1     0     0     0 ]
[ -0.5     0   0.5     0     0 ]
[    0  -0.5     0   0.5     0 ]
[    0     0  -0.5     0   0.5 ]
[    0     0     0    -1     1 ]


D2X =

[ 0   0   0   0   0 ]
[ 1  -2   1   0   0 ]
[ 0   1  -2   1   0 ]
[ 0   0   1  -2   1 ]
[ 0   0   0   0   0 ]


DY =

[ 0   0   0   0   0 ]
[ 0   0   0   0   0 ]
[ 0   0   0   0   0 ]
[ 0   0   0   0   0 ]
[ 0   0   0   0   0 ]
```

```
D2Y =

[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
[ 0  0  0  0  0 ]
```

```
 GRID SIZE: Nx = 3, Ny = 3
RESOLUTION: dx = 1, dy = 2
      BC's: NEUMANN

DX =

[  -1    1    0    0    0    0    0    0    0 ]
[ -0.5   0   0.5   0    0    0    0    0    0 ]
[   0   -1    1    0    0    0    0    0    0 ]
[   0    0    0   -1    1    0    0    0    0 ]
[   0    0    0  -0.5   0   0.5   0    0    0 ]
[   0    0    0    0   -1    1    0    0    0 ]
[   0    0    0    0    0    0   -1    1    0 ]
[   0    0    0    0    0    0  -0.5   0   0.5 ]
[   0    0    0    0    0    0    0   -1    1  ]


D2X =

[ 0   0   0   0   0   0   0   0   0 ]
[ 1  -2   1   0   0   0   0   0   0 ]
[ 0   0   0   0   0   0   0   0   0 ]
[ 0   0   0   0   0   0   0   0   0 ]
[ 0   0   0   1  -2   1   0   0   0 ]
[ 0   0   0   0   0   0   0   0   0 ]
[ 0   0   0   0   0   0   0   0   0 ]
[ 0   0   0   0   0   0   1  -2   1 ]
[ 0   0   0   0   0   0   0   0   0 ]


DY =

[  -0.5    0     0    0.5    0     0     0     0     0  ]
[    0   -0.5    0     0    0.5    0     0     0     0  ]
[    0     0   -0.5    0     0    0.5    0     0     0  ]
[ -0.25    0     0     0     0     0    0.25   0     0  ]
[    0   -0.25   0     0     0     0     0    0.25   0  ]
[    0     0   -0.25   0     0     0     0     0    0.25 ]
[    0     0     0   -0.5    0     0    0.5    0     0  ]
[    0     0     0     0   -0.5    0     0    0.5    0  ]
[    0     0     0     0     0   -0.5    0     0    0.5 ]


D2Y =

[    0     0     0     0     0     0     0     0     0  ]
[    0     0     0     0     0     0     0     0     0  ]
[    0     0     0     0     0     0     0     0     0  ]
[ 0.25    0     0   -0.5    0     0   0.25    0     0  ]
[    0   0.25    0     0   -0.5    0     0   0.25    0  ]
[    0     0   0.25    0     0   -0.5    0     0   0.25 ]
[    0     0     0     0     0     0     0     0     0  ]
[    0     0     0     0     0     0     0     0     0  ]
[    0     0     0     0     0     0     0     0     0  ]
```

```
 GRID SIZE: Nx = 3, Ny = 5
RESOLUTION: dx = 1, dy = 2
      BC's: NEUMANN

DX =

[  -1    1    0    0    0    0    0    0    0    0    0    0    0    0    0 ]
[ -0.5   0   0.5   0    0    0    0    0    0    0    0    0    0    0    0 ]
[   0   -1    1    0    0    0    0    0    0    0    0    0    0    0    0 ]
[   0    0    0   -1    1    0    0    0    0    0    0    0    0    0    0 ]
[   0    0    0  -0.5   0   0.5   0    0    0    0    0    0    0    0    0 ]
[   0    0    0    0   -1    1    0    0    0    0    0    0    0    0    0 ]
[   0    0    0    0    0    0   -1    1    0    0    0    0    0    0    0 ]
[   0    0    0    0    0    0  -0.5   0   0.5   0    0    0    0    0    0 ]
[   0    0    0    0    0    0    0   -1    1    0    0    0    0    0    0 ]
[   0    0    0    0    0    0    0    0    0   -1    1    0    0    0    0 ]
[   0    0    0    0    0    0    0    0    0  -0.5   0   0.5   0    0    0 ]
[   0    0    0    0    0    0    0    0    0    0   -1    1    0    0    0 ]
[   0    0    0    0    0    0    0    0    0    0    0    0   -1    1    0 ]
[   0    0    0    0    0    0    0    0    0    0    0    0  -0.5   0   0.5 ]
[   0    0    0    0    0    0    0    0    0    0    0    0    0   -1    1  ]
```

```
D2X =

[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  1  -2   1   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   1  -2   1   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   1  -2   1   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   1  -2   1   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   1  -2   1 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
```

```
DY =

[ -0.5      0      0    0.5      0      0      0      0      0      0      0      0      0      0      0 ]
[    0   -0.5      0      0    0.5      0      0      0      0      0      0      0      0      0      0 ]
[    0      0   -0.5      0      0    0.5      0      0      0      0      0      0      0      0      0 ]
[-0.25      0      0      0      0      0   0.25      0      0      0      0      0      0      0      0 ]
[    0  -0.25      0      0      0      0      0   0.25      0      0      0      0      0      0      0 ]
[    0      0  -0.25      0      0      0      0      0   0.25      0      0      0      0      0      0 ]
[    0      0      0  -0.25      0      0      0      0      0   0.25      0      0      0      0      0 ]
[    0      0      0      0  -0.25      0      0      0      0      0   0.25      0      0      0      0 ]
[    0      0      0      0      0  -0.25      0      0      0      0      0   0.25      0      0      0 ]
[    0      0      0      0      0      0  -0.25      0      0      0      0      0   0.25      0      0 ]
[    0      0      0      0      0      0      0  -0.25      0      0      0      0      0   0.25      0 ]
[    0      0      0      0      0      0      0      0  -0.25      0      0      0      0      0   0.25 ]
[    0      0      0      0      0      0      0      0      0   -0.5      0      0    0.5      0      0 ]
[    0      0      0      0      0      0      0      0      0      0   -0.5      0      0    0.5      0 ]
[    0      0      0      0      0      0      0      0      0      0      0   -0.5      0      0    0.5 ]
```

```
D2Y =

[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[ 0.25      0      0   -0.5      0      0   0.25      0      0      0      0      0      0      0      0 ]
[    0   0.25      0      0   -0.5      0      0   0.25      0      0      0      0      0      0      0 ]
[    0      0   0.25      0      0   -0.5      0      0   0.25      0      0      0      0      0      0 ]
[    0      0      0   0.25      0      0   -0.5      0      0   0.25      0      0      0      0      0 ]
[    0      0      0      0   0.25      0      0   -0.5      0      0   0.25      0      0      0      0 ]
[    0      0      0      0      0   0.25      0      0   -0.5      0      0   0.25      0      0      0 ]
[    0      0      0      0      0      0   0.25      0      0   -0.5      0      0   0.25      0      0 ]
[    0      0      0      0      0      0      0   0.25      0      0   -0.5      0      0   0.25      0 ]
[    0      0      0      0      0      0      0      0   0.25      0      0   -0.5      0      0   0.25 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
```

```
 GRID SIZE: Nx = 5, Ny = 3
RESOLUTION: dx = 1, dy = 2
      BC's: NEUMANN
```

```
DX =

[   -1      1      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[ -0.5      0    0.5      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0   -0.5      0    0.5      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0   -0.5      0    0.5      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0     -1      1      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0     -1      1      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0   -0.5      0    0.5      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0   -0.5      0    0.5      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0   -0.5      0    0.5      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0     -1      1      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0     -1      1      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0   -0.5      0    0.5      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0   -0.5      0    0.5      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0   -0.5      0    0.5 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0     -1      1 ]
```

```
D2X =

[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  1  -2   1   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   1  -2   1   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   1  -2   1   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   1  -2   1   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   1  -2   1   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   1  -2   1   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   1  -2   1   0   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   1  -2   1   0 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   1  -2   1 ]
[  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 ]
```

```
DY =

[ -0.5      0      0      0      0    0.5      0      0      0      0      0      0      0      0      0 ]
[    0   -0.5      0      0      0      0    0.5      0      0      0      0      0      0      0      0 ]
[    0      0   -0.5      0      0      0      0    0.5      0      0      0      0      0      0      0 ]
[    0      0      0   -0.5      0      0      0      0    0.5      0      0      0      0      0      0 ]
[    0      0      0      0   -0.5      0      0      0      0    0.5      0      0      0      0      0 ]
[ -0.25     0      0      0      0      0      0      0      0      0   0.25      0      0      0      0 ]
[    0  -0.25      0      0      0      0      0      0      0      0      0   0.25      0      0      0 ]
[    0      0  -0.25      0      0      0      0      0      0      0      0      0   0.25      0      0 ]
[    0      0      0  -0.25      0      0      0      0      0      0      0      0      0   0.25      0 ]
[    0      0      0      0  -0.25     0      0      0      0      0      0      0      0      0   0.25 ]
[    0      0      0      0      0   -0.5      0      0      0      0    0.5      0      0      0      0 ]
[    0      0      0      0      0      0   -0.5      0      0      0      0    0.5      0      0      0 ]
[    0      0      0      0      0      0      0   -0.5      0      0      0      0    0.5      0      0 ]
[    0      0      0      0      0      0      0      0   -0.5      0      0      0      0    0.5      0 ]
[    0      0      0      0      0      0      0      0      0   -0.5      0      0      0      0    0.5 ]
```

```
D2Y =

[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[ 0.25      0      0      0      0   -0.5      0      0      0      0   0.25      0      0      0      0 ]
[    0   0.25      0      0      0      0   -0.5      0      0      0      0   0.25      0      0      0 ]
[    0      0   0.25      0      0      0      0   -0.5      0      0      0      0   0.25      0      0 ]
[    0      0      0   0.25      0      0      0      0   -0.5      0      0      0      0   0.25      0 ]
[    0      0      0      0   0.25      0      0      0      0   -0.5      0      0      0      0   0.25 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
```

```
 GRID SIZE: Nx = 4, Ny = 4
RESOLUTION: dx = 1, dy = 2
      BC's: NEUMANN
```

```
DX =

[   -1      1      0      0      0      0      0      0      0      0      0      0      0      0      0 ]
[ -0.5      0    0.5      0      0      0      0      0      0      0      0      0      0      0      0 ]
[    0   -0.5      0    0.5      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0     -1      1      0      0      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0     -1      1      0      0      0      0      0      0      0      0      0 ]
[    0      0      0      0   -0.5      0    0.5      0      0      0      0      0      0      0      0 ]
[    0      0      0      0      0   -0.5      0    0.5      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0     -1      1      0      0      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0     -1      1      0      0      0      0      0 ]
[    0      0      0      0      0      0      0      0   -0.5      0    0.5      0      0      0      0 ]
[    0      0      0      0      0      0      0      0      0   -0.5      0    0.5      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0     -1      1      0      0      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0     -1      1      0 ]
[    0      0      0      0      0      0      0      0      0      0      0      0   -0.5      0    0.5 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0     -1      1 ]
```

```
D2X =

[  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0   ]
[  1   -2    1    0    0    0    0    0    0    0    0    0    0    0    0    0   ]
[  0    1   -2    1    0    0    0    0    0    0    0    0    0    0    0    0   ]
[  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0   ]
[  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0   ]
[  0    0    0    0    1   -2    1    0    0    0    0    0    0    0    0    0   ]
[  0    0    0    0    0    1   -2    1    0    0    0    0    0    0    0    0   ]
[  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0   ]
[  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0   ]
[  0    0    0    0    0    0    0    0    1   -2    1    0    0    0    0    0   ]
[  0    0    0    0    0    0    0    0    0    1   -2    1    0    0    0    0   ]
[  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0   ]
[  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0   ]
[  0    0    0    0    0    0    0    0    0    0    0    0    1   -2    1    0   ]
[  0    0    0    0    0    0    0    0    0    0    0    0    0    1   -2    1   ]
[  0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0   ]


DY =

[ -0.5     0      0      0     0.5     0      0      0      0      0      0      0      0      0      0      0   ]
[    0   -0.5     0      0      0     0.5     0      0      0      0      0      0      0      0      0      0   ]
[    0     0    -0.5     0      0      0     0.5     0      0      0      0      0      0      0      0      0   ]
[    0     0      0    -0.5     0      0      0     0.5     0      0      0      0      0      0      0      0   ]
[ -0.25    0      0      0      0      0      0      0     0.25    0      0      0      0      0      0      0   ]
[    0   -0.25    0      0      0      0      0      0      0     0.25    0      0      0      0      0      0   ]
[    0     0    -0.25    0      0      0      0      0      0      0     0.25    0      0      0      0      0   ]
[    0     0      0    -0.25    0      0      0      0      0      0      0     0.25    0      0      0      0   ]
[    0     0      0      0    -0.25    0      0      0      0      0      0      0     0.25    0      0      0   ]
[    0     0      0      0      0    -0.25    0      0      0      0      0      0      0     0.25    0      0   ]
[    0     0      0      0      0      0    -0.25    0      0      0      0      0      0      0     0.25    0   ]
[    0     0      0      0      0      0      0    -0.25    0      0      0      0      0      0      0     0.25 ]
[    0     0      0      0      0      0      0      0    -0.5     0      0      0     0.5     0      0      0   ]
[    0     0      0      0      0      0      0      0      0    -0.5     0      0      0     0.5     0      0   ]
[    0     0      0      0      0      0      0      0      0      0    -0.5     0      0      0     0.5     0   ]
[    0     0      0      0      0      0      0      0      0      0      0    -0.5     0      0      0     0.5 ]


D2Y =

[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   ]
[ 0.25     0      0      0    -0.5     0      0      0     0.25    0      0      0      0      0      0      0   ]
[    0    0.25    0      0      0    -0.5     0      0      0     0.25    0      0      0      0      0      0   ]
[    0     0    0.25     0      0      0    -0.5     0      0      0     0.25    0      0      0      0      0   ]
[    0     0      0    0.25     0      0      0    -0.5     0      0      0     0.25    0      0      0      0   ]
[    0     0      0      0    0.25     0      0      0    -0.5     0      0      0     0.25    0      0      0   ]
[    0     0      0      0      0    0.25     0      0      0    -0.5     0      0      0     0.25    0      0   ]
[    0     0      0      0      0      0    0.25     0      0      0    -0.5     0      0      0     0.25    0   ]
[    0     0      0      0      0      0      0    0.25     0      0      0    -0.5     0      0      0     0.25 ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   ]
[    0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0   ]
```