Problem #1: calcpml2d() function

Write a MATLAB function to calculate the UPML parameters sx and sy on a 2D grid. Follow Lecture 8 with the following parameters for the UPML: $a_{\max} = 3$, $\sigma'_{\max} = 1$, and $p = 3$. Note that sx and sy are not matrices here; they are 2D arrays. Use the following header:

```
function [sx,sy] = calcpml2d(NGRID,NPML)
% CALCPML2D      Calculate the PML parameters on a 2D grid
%
% [sx,sy] = calcpml2d(NGRID,NPML);
%
% This MATLAB function calculates the PML parameters sx and sy
% to absorb outgoing waves on a 2D grid.
%
% Input Arguments
% ================
% NGRID Array containing the number of points in the grid
%       = [ Nx Ny ]
% NPML  Array containing the size of the PML at each boundary
%       = [ Nxlo Nxhi Nylo Nyhi ]
%
% Output Arguments
% ================
% sx,sy 2D arrays containing the PML parameters on a 2D grid
```

☐ I have verified that my function is working correctly by using test_calcpml2d.p.

Problem #2: yeeder() function

Write a MATLAB function that calculates the derivative matrices $\mathbf{D}_x^e$, $\mathbf{D}_y^e$, $\mathbf{D}_x^h$, and $\mathbf{D}_y^h$ which calculate second-order accurate first-order derivatives across a two-dimensional Yee grid. Write your function so that the input argument kinc only needs to be provided when it is needed (i.e. BC=-2). Use the following header:

```
function [DEX,DEY,DHX,DHY] = yeeder(NGRID,RES,BC,kinc)
% YEEDER      Construct Yee Grid Derivative Operators on a 2D Grid
%
% [DEX,DEY,DHX,DHY] = yeeder(NGRID,RES,BC,kinc);
%
% Note for normalized grid, use this function as follows:
%
% [DEX,DEY,DHX,DHY] = yeeder(NGRID,k0*RES,BC,kinc/k0);
%
% Input Arguments
% ================
% NGRID     [Nx Ny] grid size
% RES       [dx dy] grid resolution of the 1X grid
% BC        [xbc ybc] boundary conditions
%           -2: periodic (requires kinc)
%            0: Dirichlet
% kinc      [kx ky] incident wave vector
%           This argument is only needed for periodic boundaries.
```

☐ I have verified that my function is working correctly by using test_yeeder.p.