MakeCircleMatchingFilter

Create a function **MakeCircleMatchingFilter**, which you will use in your final project script. It takes as input filter. It outputs the [**W**x**W**] matrix **filter**, which is a binary mask that contains, as foreground, a circle with wid **filter** serves as a matching filter for circular shapes with approximately the same diameter. The function also and 3rd optional outputs.

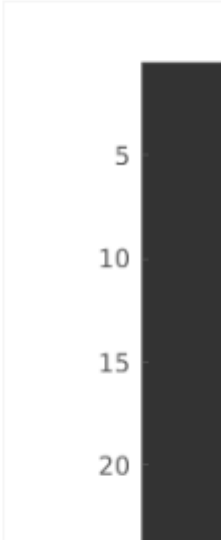
The steps to perform in the function are as follows:

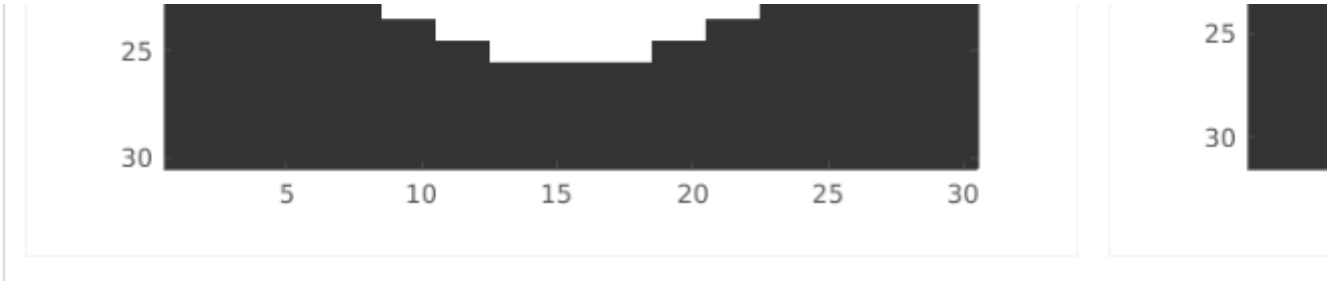
- Initialize **filter** as a background (zeros) matrix.
- Find the coordinates of the center of the **filter**, **xc,** and **yc**.
- Use nested for loops to loop across every row and column of the filter matrix. For each pixel, determ radius relative to the center of the filter. If so, should be labelled as foreground with a 1.

When running the example code below, your function should result in output identically to this:

Output

```
xc =

   15.5000


yc =

   15.5000


xc =

    16


yc =

    16
```





Function

Save Reset MATLAB Documentation (https://www.mathworks.com/help/)

```
function [filter,xc,yc] = MakeCircleMatchingFilter(diameter,W)
% Initialize filter
    filter = zeros(W,W);
% Define coordinates for the center of the W x W filter
    xc = (1 + W) / 2;
    yc = (1 + W) / 2;
% Use nested for loops to check if each pixel lies in the foreground of the
    for i = 1 : W
         for j = 1 : W
             if sqrt((j - xc)*(j - xc) + (i - yc)*(i - yc)) <= (diameter/2)
                 filter(i,j) = 1;
             end
         end
    end
end

```

Code to call your function

Reset

```
diameter = 20;
W = 30;
[filter, xc, yc] = MakeCircleMatchingFilter(diameter,W);
imagesc(filter); colormap(gray)
xc % should be 15.5
yc % should be 15.5

diameter = 20;
W = 31;
[filter, xc, yc] = MakeCircleMatchingFilter(diameter,W);
figure; imagesc(filter); colormap(gray);
xc % should be 16
yc % should be 16
```

Run Function

Assessment: All Tests Passed

Submit

- Is xc correct?
- Is yc correct?
- Is filter correct?