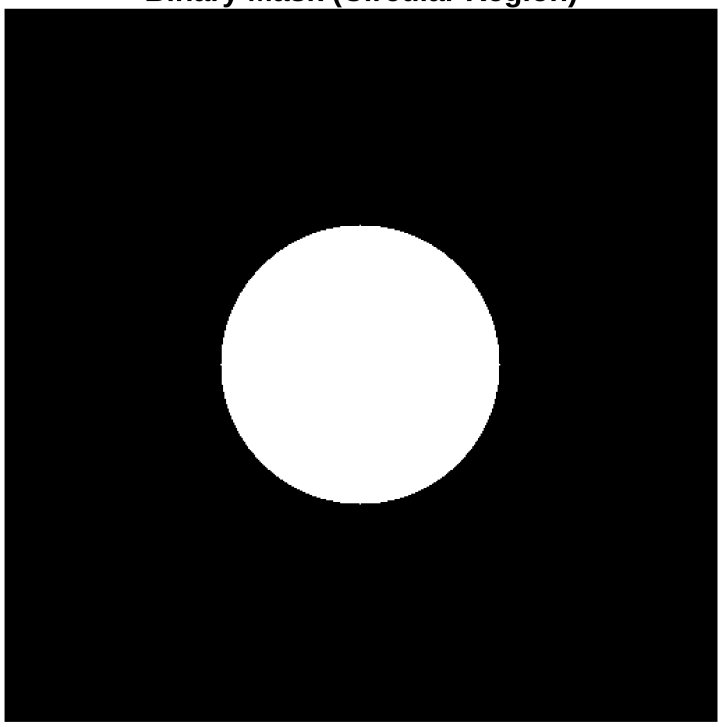
```
% Loading the image lena
image = imread('/MATLAB Drive/lena.png');

% Converting the image lena to grayscale because it is in color
grayImage = rgb2gray(image);

% Manually creating a binary mask for the region of interest
% creating a circular mask for that

% Defining mask dimensions below
mask = zeros(size(grayImage));

% Creating a circular mask
centerX = size(grayImage, 2) / 2;
centerY = size(grayImage, 1) / 2;
radius = 100;

for x = 1:size(mask, 2)
    for y = 1:size(mask, 1)
        % This condition checks if the pixel lies within the defined radius
from the center
        if (x - centerX)^2 + (y - centerY)^2 <= radius^2
            mask(y, x) = 1;  % Set the pixel to 1 (white) inside the
circular region
        else
            mask(y, x) = 0;  % Set the pixel to 0 (black) outside the circle
        end
    end
end

% Displaying the binary mask below
figure;
imshow(mask);
title('Binary Mask (Circular Region)');
```



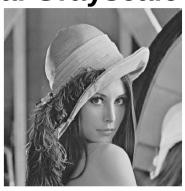

```
% Applying the binary mask to the grayscale image lena
% In below step isolating the region of interest
roiImage = uint8(double(grayImage) .* mask);

% Displaying the image lena after applying the binary mask
figure;
imshow(roiImage);
title('Region of Interest with Binary Mask Applied');
```

Region of Interest with Binary Mask Applied

```
% Low-pass filters: Gaussian and Average
% Gaussian filter
gaussianFiltered = imgaussfilt(roiImage, 2);  % Sigma = 2

% Average filter
averageFilter = fspecial('average', [5 5]);
averageFiltered = imfilter(roiImage, averageFilter);

% High-pass filters: Laplacian and Prewitt
% Laplacian filter
laplacianFilter = fspecial('laplacian', 0.2);  % Alpha = 0.2
laplacianFiltered = imfilter(roiImage, laplacianFilter);

% Prewitt filter: (horizontal and vertical edges)
prewittHorizontal = fspecial('prewitt');
prewittFiltered = imfilter(roiImage, prewittHorizontal);

% Displaying all the results below
figure;
subplot(3, 2, 1), imshow(grayImage), title('Original Grayscale Image');
subplot(3, 2, 2), imshow(roiImage), title('Region of Interest');
subplot(3, 2, 3), imshow(gaussianFiltered), title('Gaussian Filter');
subplot(3, 2, 4), imshow(averageFiltered), title('Average Filter');
subplot(3, 2, 5), imshow(laplacianFiltered), title('Laplacian Filter');
```

```
subplot(3, 2, 6), imshow(prewittFiltered), title('Prewitt Filter');
```

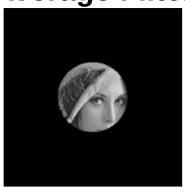
Original Grayscale Image



Region of Interest

Gaussian Filter

Average Filter



Laplacian Filter

Prewitt Filter