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%% Surendra Assignment: Question 1 and Question 5 (MATLAB)
% This script answers both Question 1 and Question 5 for the assignment.

% Load the image (path)
surendra_dip2_img = imread('/MATLAB Drive/surendra_dip2.jpeg');
figure, imshow(surendra_dip2_img);
title('Original Image - surendra_dip2');
```


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%% Question 1: Binary Mask and Low-Pass/High-Pass Filters
% Step 1: Convert the image to grayscale
surendra_dip2_gray = rgb2gray(surendra_dip2_img);
figure, imshow(surendra_dip2_gray);
title('Question 1: Grayscale Image - surendra_dip2');
```

Question 1: Grayscale Image - surendra$_d$ip2

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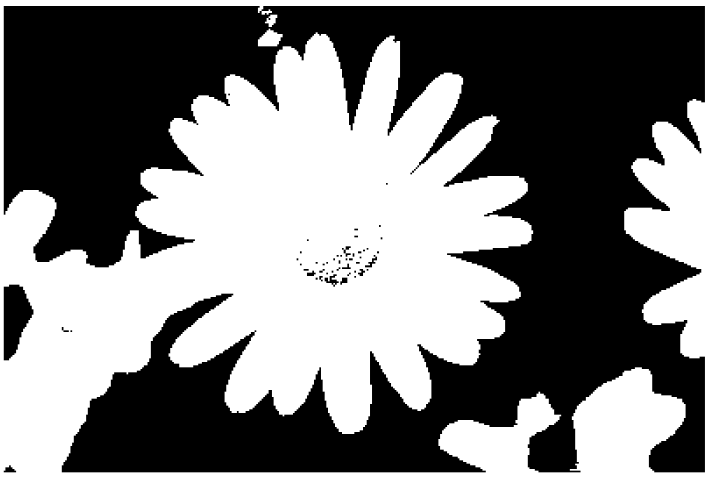
% Step 2: Create a Binary Mask using thresholding
threshold_surendra = 135;  % Set a threshold value for this version
binary_mask_surendra = surendra_dip2_gray > threshold_surendra;
figure, imshow(binary_mask_surendra);
title('Question 1: Binary Mask for ROI - surendra_dip2');
```

Question 1: Binary Mask for ROI - surendra$_d$ip2



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% Step 3: Apply Low-pass Filters
% 3a. Gaussian Filter (Low-pass) with different sigma
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surendra_dip2_gaussian = imgaussfilt(surendra_dip2_gray, 3); % Sigma set to
3 for uniqueness
figure, imshow(surendra_dip2_gaussian);
title('Question 1: Gaussian Low-pass Filter - surendra_dip2');
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Question 1: Gaussian Low-pass Filter - surendra$_{d}$ip2

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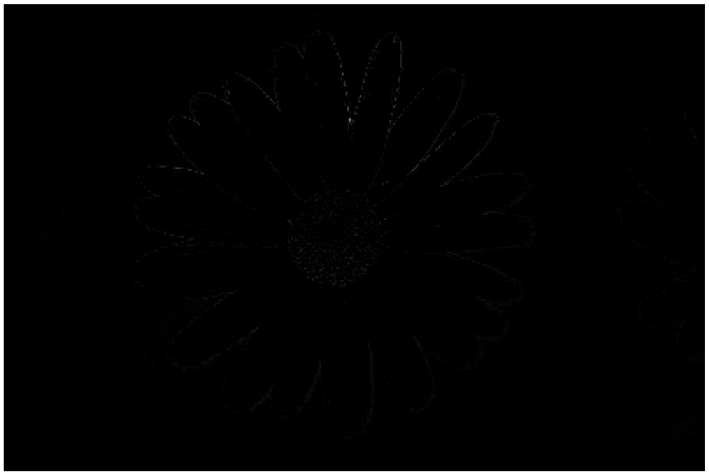
% 3b. Median Filter (Low-pass)
surendra_dip2_median = medfilt2(surendra_dip2_gray, [5 5]); % Applying a
median filter for this version
figure, imshow(surendra_dip2_median);
title('Question 1: Median Low-pass Filter - surendra_dip2');
```

Question 1: Median Low-pass Filter - surendra$_{d}$ip2

```
% Step 4: Apply High-pass Filters
% 4a. Laplacian Filter (High-pass) using a unique parameter
laplacian_filter_surendra = fspecial('laplacian', 0.5);
surendra_dip2_laplacian = imfilter(surendra_dip2_gray,
laplacian_filter_surendra);
figure, imshow(surendra_dip2_laplacian);
title('Question 1: Laplacian High-pass Filter - surendra_dip2');
```

Question 1: Laplacian High-pass Filter - surendra$_{d}$ip2



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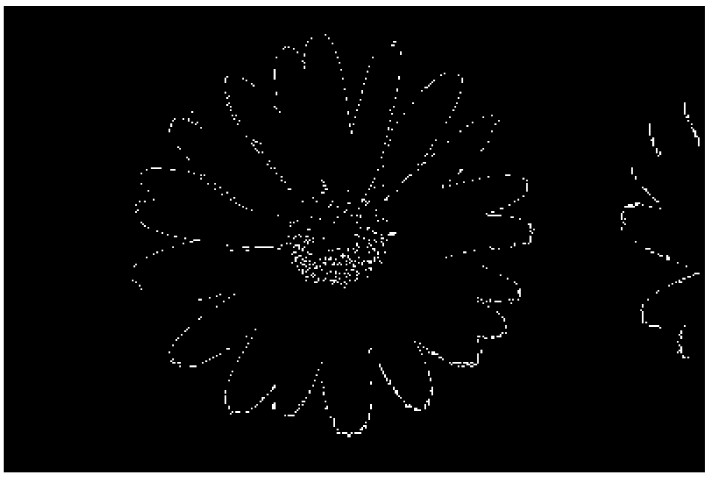
% 4b. Sobel Filter (High-pass) instead of Prewitt for variety
sobel_filter_surendra = edge(surendra_dip2_gray, 'sobel');
figure, imshow(sobel_filter_surendra);
title('Question 1: Sobel High-pass Filter - surendra_dip2');
```

Question 1: Sobel High-pass Filter - surendra$_d$ip2



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%% Question 5: Quantize to 32 Grayscale Levels
% Step 1: Quantize the image to 32 grayscale levels
surendra_dip2_num_levels = 32;
surendra_dip2_quantized = floor(double(surendra_dip2_gray) / (256 /
surendra_dip2_num_levels)) * (256 / surendra_dip2_num_levels);
surendra_dip2_quantized = uint8(surendra_dip2_quantized); % Convert to uint8
figure, imshow(surendra_dip2_quantized);
title('Question 5: 32-Level Grayscale Quantized Image - surendra_dip2');
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% Step 2: Resize quantized image back to original size
surendra_dip2_quantized_resized = imresize(surendra_dip2_quantized,
size(surendra_dip2_gray));
figure, imshow(surendra_dip2_quantized_resized);
title('Question 5: Resized Quantized Image - surendra_dip2');
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%% End of Script
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