question 3

```python
from PIL import Image
import numpy as np
import matplotlib.pyplot as plt

# Kuwahara filter function with variable window size
def kuwahara_filter(image, window_size=5):
    img = np.array(image, dtype=float)
    pad_size = window_size // 2
    padded_img = np.pad(img, pad_size, mode='reflect')

    rows, cols = img.shape
    result_img = np.zeros_like(img)

    for y in range(rows):
        for x in range(cols):
            # Extract the window (window_size x window_size)
            window = padded_img[y:y+window_size, x:x+window_size]

            # Divide the window into four subregions
            top_left = window[:pad_size+1, :pad_size+1]
            top_right = window[:pad_size+1, pad_size:]
            bottom_left = window[pad_size:, :pad_size+1]
            bottom_right = window[pad_size:, pad_size:]

            # Calculate the mean and variance for each subregion
            regions = [top_left, top_right, bottom_left, bottom_right]
            means = [np.mean(region) for region in regions]
            variances = [np.var(region) for region in regions]

            # Find the region with the smallest variance
            min_variance_idx = np.argmin(variances)
            result_img[y, x] = means[min_variance_idx]

    return result_img.astype(np.uint8)

# Load an image (grayscale)
image_path = 'image_bmp.bmp'  # Replace with your image path
image = Image.open(image_path).convert('L')  # Convert to grayscale

# Apply Kuwahara filter with different window sizes
kuwahara_result_5 = kuwahara_filter(image, window_size=5)
kuwahara_result_7 = kuwahara_filter(image, window_size=7)
kuwahara_result_9 = kuwahara_filter(image, window_size=9)

# Plot the original and filtered images for different window sizes
plt.figure(figsize=(12, 8))
```

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plt.subplot(2, 2, 1)
plt.imshow(image, cmap='gray')
plt.title("Original Image")
plt.axis('off')

plt.subplot(2, 2, 2)
plt.imshow(kuwahara_result_5, cmap='gray')
plt.title("Kuwahara Filter (Window Size 5)")
plt.axis('off')

plt.subplot(2, 2, 3)
plt.imshow(kuwahara_result_7, cmap='gray')
plt.title("Kuwahara Filter (Window Size 7)")
plt.axis('off')

plt.subplot(2, 2, 4)
plt.imshow(kuwahara_result_9, cmap='gray')
plt.title("Kuwahara Filter (Window Size 9)")
plt.axis('off')

plt.tight_layout()
plt.show()
```