

**Part .**

**1. What are the three applications of image filtering?** Edge detection, template matching, texture analysis and synthesis

**2. What is the difference between the mean filtering and the median filtering?** Median filtering is non-linear and preserves edges while mean smoothes out the image. Median retains all existing pixel values and doesn't create new values. Median also removes spikes and salt pepper noise.

**3. In class, we talked about image smoothing followed by computing image gradients. Is it identical to computing image gradients first and then perform image smoothing on the resulting image gradients?** No, it's different, since the paths will likely change if blurring→calculate seam vs. calculate seam→blurring.

**4. How to take the advantage of the separability of a filter for fast image filtering calculation?** We can convolve the rows and columns of the image separately, each using its own matrix operation. This makes the image filtering more efficient.

**5. In non-maximum suppressing, we detect the maximum pixel along the image gradient direction. Provide examples where this approach is sub-optimal. You can draw illustrations or provide results on real examples. Please provide a short justification (2-3 sentences) on why this is the case.**

**Extra credit (5points).** So far we have covered filtering and edge detection for images. Please mention how to extend the idea to videos. Please discuss how to de-noise in both the spatial and/or temporal domain, how to compute gradients in the spatial and/or temporal domain, and how to detect "edges" in the spatial and/or temporal domain.