CS 558, Fall 2019, Quiz 3

NAME:

Problem 1. Explain a) WHY after applying a mean filter, the maximum intensity of an image cannot increase? b) WHEN does the maximum stay the same after filtering? The filter is square ($n \times n$), all weights are equal and they sum to 1.

Problem 2. a) WHY should image gradient estimation be performed over a pre-smoothed image? b) HOW can differentiation and smoothing be performed at the same time?

Problem 3. Let $\mathbf{A} = [A]_{ij}$ be 3×3 diagonal matrix with $A_{ii} = i$ and $\mathbf{p} = (x, y, z)^\top$ be a vector. Write the expression for the quadratic form $\mathbf{p}^\top \mathbf{A} \mathbf{p}$