WORST MIDTERM AVG Q's

- Let H_n be the normalized hist of f. Contrast is statistically optimal if for any gray level u we have $H_n(u) =$ **?**
  - ☒ $H_n(u) = 1/256$
- A gray level mapping m is applied to 8-bit, the output images are always completely black (the only gray level is 0), completely white(the only gray level is 255), or black and white (the gray levels are 0 and 255), select all that apply.
  - ◇ We can be certain that m is NOT a linear mapping
  - ◇ We can be certain that m is NOT a piece-wise linear mapping
  - ☒ We can be certain that m is NOT a log mapping
  - ◇ We can be certain that m is NOT a power law mapping
- Consider five pixel locations $p1, p2, p3, p4, p5$ in an image and five pixel locations $q1, q2, q3, q4, q5$ in another image. We are looking for a function T such that $T(p1) = q1, T(p2) = q2, T(p3) = q3, T(p4) = q4, T(p5) = q5$. Which one of the following best describes this problem?
  - ◇ Single pixel operation
  - ◇ Neighborhood operation
  - ◇ Geometric spatial transformation
  - ◇ Image transform
  - ◇ binary single pixel operation
  - ☒ Image registration
  - ◇ Multispectral transformation
- An $M \times N$ image f is resized into a $P \times Q$ image g. The associated spatial transformation is a function T from $\mathbb{R}^2 \to \mathbb{R}^2$ that maps (x, y) to (u, v) where $u =$ **?**
  - ☒ $u = x(P-1)/(M-1)$
- Consider the total functions from $\mathbb{Z}^2 \to \mathbb{Z}^2$ into $\mathbb{R}$ defined below. Which one/s is/are NOT distances on $\mathbb{Z}^2$?
  - ☒ $f((x, y), (x', y')) = min(|x - x'|, |y - y'|)$
  - ◇ $f((x, y), (x', y')) = (|x - x'|, |y - y'|)/2$
  - ◇ $f((x, y), (x', y')) = max(|x - x'|, |y - y'|)$
- Consider the convolution kernel h and the image f below. $(2, 2)$ is the location at the centre of the image f. we have $(h * f)(2, 2) =$ **?**
  - ◇ [[1 2 3], [4 5 6], [7 8 9]] $*$ [[5 7 1 0 4], [0 1 1 0 2], [4 0 3 1 4]] contd… (didn't have enough time to type entire kernel)
  - ☒ = **68**
- The term "negation of an 8-bit grayscale image" actually refers to a fuzzy negation. There is an infinite number of fuzzy negations. For example a Sugeno negation is a fuzzy negation that maps an element of t of [0, 1] to **?**, where p is a real number greater than -1
  - ☒ $(1-t)/\{1+pt\}$
  - ☒ $(1-t)/\{1+tp\}$
  - ☒ $(1-t)/\{pt+1\}$
  - ☒ $(1-t)/\{tp+1\}$