CPSC 4040/6040
Computer Graphics Images

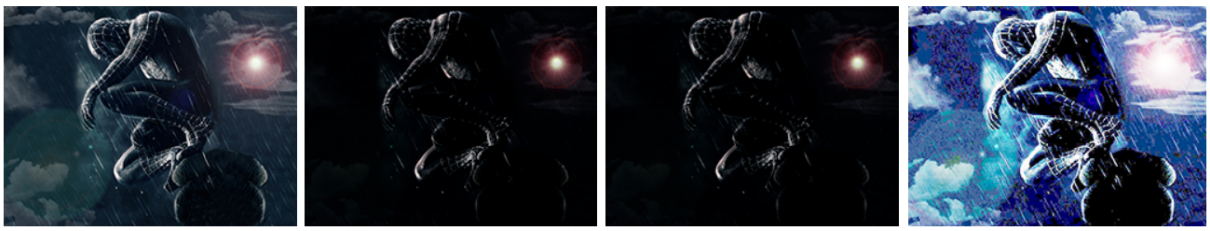
Assigned: Sep 29, 2021
Due: Oct 6, 2021 (start of class)

Quiz 5 *(Grading: 0–4 points)*

1. Provide the histogram equalized version of the following 3-bit image shown below. **[4pts]**

5	1	3	4
1	2	2	3
1	3	4	4

2. Below there are three images of Spiderman. Image a) is the original image, which is dark, but shows lots of fine detail. Image b) was derived from the original by considerably darkening the midtones so that much of the detail in the image is obscured. Image c) is a normalized version of the second image. Image d) is a histogram equalized version of image b).



a) Original Image b) Darkened Image c) Normalized Darkened Image d) Equalized Darkened Image

i) Please explain why images b) and c) look identical. **[2pts]**

ii) Explain how a second pass of histogram equalization will affect the result from the first pass shown in d). **[1pt]**

3. You are given a 300×300 image I where all pixels have the same value, and a smoothing kernel H of size 5×5. Please answer the following questions:

   i) Would the histograms of the input image I and the blurred image $H \otimes I$ be equal? Explain. **[1pt]**

   ii) How many multiplications are required to compute $H \otimes I$? How many multiplications are required if you exploit the fact that the given kernel is *separable*? In both cases, be sure to state your boundary condition. **[2pts]**