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Quiz 3

(Grading: 0–10 points)

1.  $3 \times 3$  convolution kernels can create a variety of effects. Consider the following four kernels. First, list the appropriate scale factor you would use for this kernel (see the instructions for Lab04 for a definition). Next, briefly describe how an image would change if convolved with the kernel:

(a)  $H_1 = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(b)  $H_2 = \begin{bmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{bmatrix}$

(c)  $H_3 = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{bmatrix}$

(d)  $H_4 = \begin{bmatrix} 0 & -1 & 2 \\ 1 & 1 & -1 \\ 2 & 1 & 0 \end{bmatrix}$

2. Given an image  $I$  of  $200 \times 300$ , and a kernel  $K$  of size  $5 \times 5$ , how many multiplications are required to compute  $K \otimes I$ ? Be sure to state your boundary condition.
3. What is a pixel? How big is a pixel? Both of these questions have multiple answers, briefly explain yours.
4. You are designing a compression algorithm for images stored in HSV format. Which channel should you compress the most, and why?