

## Assignment 8

Due: Mon 3/4 11:59 EST

### Edge Detection

1. (10 pts) For the set of images in `imagesWk8.zip`, segment out the edges in the images.

### Probability Theory Review

Submit your answers electronically.

2. (5 pts) Suppose that you have 8 cards. 5 are green and 3 are yellow. The 5 green cards are numbered 1, 2, 3, 4, and 5. The 3 yellow cards are numbered 1, 2, and 3. The cards are well shuffled. You randomly draw one card.

- $G$  = card drawn is green
- $E$  = card drawn is even-numbered

(a) List the sample space.

(b)  $P(G)$

(c)  $P(G|E)$

(d)  $P(G \text{ AND } E)$

(e)  $P(G \text{ OR } E)$

(f) Are  $G$  and  $E$  mutually exclusive? Justify your answer numerically.

3. (5 pts) Refer to the previous problem. Suppose that this time you randomly draw two cards, one at a time, and *with replacement*.

- $G_1$  = first card is green
- $G_2$  = second card is green

(a)  $P(G_1 \text{ AND } G_2)$

(b)  $P(\text{at least one green})$

(c)  $P(G_2|G_1)$

(d) Are  $G_2$  and  $G_1$  independent events? Explain why or why not.

4. (5 pts) Refer to the previous problems. Suppose that this time you randomly draw two cards, one at a time, and *without replacement*.

- $G_1$  = first card is green
- $G_2$  = second card is green

(a)  $P(G_1 \text{ AND } G_2)$

(b)  $P(\text{at least one green})$

(c)  $P(G_2|G_1)$

(d) Are  $G_2$  and  $G_1$  independent events? Explain why or why not.

5. (5 pts) Consider the following scenario:

- Let  $P(C) = 0.4$
- Let  $P(D) = 0.5$
- Let  $P(C|D) = 0.6$

(a) Find  $P(C \text{ AND } D)$ .

(b) Are C and D mutually exclusive? Why or why not?

(c) Are C and D independent events? Why or why not?

(d) Find  $P(C \text{ AND } D)$ .

(e) Find  $P(D|C)$ .