MEM: Intro to Robotics

Assignment 6I

Due: Wednesday 11/5 11:59 EST

1. **Edge Detection (10 pts)** For the set of images in `imagesA6I.zip`, segment out the edges in the images.

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 AND E)
   (e) P(G 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(\(G_1\) AND \(G_2\))
   (b) P(at least one green)
   (c) P(\(G_2|G_1\))
   (e) 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(\(G_1\) AND \(G_2\))
(b) \( P(\text{at least one green}) \)
(c) \( P(G_2|G_1) \)
(e) 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 \( P(D|C) \).