ECE 131A, Fall 2022 **Quiz #1**

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Due Saturday, 8 October 2022 by 11:59 PM, uploaded to Gradescope.
Resources: Lectures 1-4, Homework 1, Discussions 1-2.
10 points total.

1. (3 points) **Probability laws, Independence**

   (a) (1 point) Let A and B be two events. Suppose the probability that neither A or B occurs is $\frac{2}{3}$. What is the probability that one or both occur?

   (b) (1 point) Let C and D be two events with $P(C) = 0.25$, $P(D) = 0.45$, and $P(C \cap D) = 0.1$. What is $P(C^c \cap D)$?

   (c) (1 point) Suppose that $P(A) = 0.4$, $P(B) = 0.3$ and $P((A \cup B)^c) = 0.42$. Are A and B independent?

2. (4 points) **Bayes law**

   Suppose that 37% of the pages of a real analysis textbook have a theorem, 29% of the pages of an algebra textbook have a theorem, and 20% of the pages of a probability textbook have a theorem. The academic advisors have encouraged students to take at most one math course at a time, and as a result, 5% of students are taking real analysis, 13% are taking algebra, 10% are taking probability, and the other 72% are not taking a math course.

   If you randomly walk up to a table at the local coffee shop and peek over the student's shoulder, and the student happens to be reading a theorem in a math book, what is the probability that student is enrolled in a probability course?

3. (3 points) **Radar traps**

   UCLA police plan to enforce speed limits by using radar traps at 4 different locations within the UCLA campus. The radar traps at each of the locations L_1,L_2,L_3 and L_4 are operated 40%, 30%, 20%, and 30% of the time, and if a student who is speeding on his way to class has probabilities of 0.2,0.1,0.5, and 0.2, respectively, of passing through these locations, what is the probability that he will receive a speeding ticket?