EE 131A Discussion Set 1
Probability and Statistics
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Reading: Chapter 2 of *Probability, Statistics, and Random Processes* by A. Leon-Garcia

1. *(*Problem 2.13 of the book)

   Let A and B be events. Find an expression for the event exactly one of the events A and B occurs. Draw a Venn diagram for this event.

2. There is a box containing 20 lamps. Eight of these lamps are defective and do not work correctly, although they look exactly as the normal ones. We test the lamps one by one until we find all defective lamps. What is the probability of the event that the last defective lamp is found on the 12th test.

3. We have a class with N students. How large must N be for the probability of at least two students sharing the same birthday to be at least $1/2$?

4. Suppose n_1 indistinguishable white balls and n_2 indistinguishable black balls are randomly put into m distinguishable boxes. What is the probability of the event "No box is empty"?

5. (Harder) Suppose there are n indistinguishable white balls and n indistinguishable black balls in a container. There are n students, each of them randomly picks up two balls from the container together. What is the probability of the event "each student picks up exactly one white ball and one black ball"?