

Exam 2: Counting & Probability
PRACTICE EXAM

Name:

You have 75 minutes to complete the following questions without access to books or notes. Show all work and clearly indicate your solutions.

1. Stephanie's printer had four on-off switches in the back. Draw a tree diagram to systematically list all of the different possible settings.

2. Evaluate the following expressions.

(a) ${}_{11}C_8$

(b) ${}_9P_4$

3. A committee has 6 members, Anna, Ben, Christine, David, Ellen, and Frank. They need two people to represent their committee at a conference.

(a) How many different ways could they do this?

(b) How many ways can they do this such that at least one woman from the committee is at the conference?

4. A California license plate has seven characters that are either letters of the English alphabet or digits 0-9. How many different license plates are there?

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5. There are 8 flags, two of which are blue, three are red, two are yellow, and one is green. You cannot distinguish between two flags of the same color. How many distinct arrangements of these are there?
6. Consider selecting one random number from the sample space $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$.
- (a) How many ways are there to select an odd or a multiple of 4?

 - (b) How many ways are there to select an odd and a multiple of 3?

 - (c) Given that you select a multiple of 3, what's the probability of selecting an odd?
7. There are 2598960 possible 5-card poker hands from a standard 52-card deck.
- (a) How many contain at least one card that's not a hearts?

 - (b) What's the probability that you draw a hand that contains atleast one card that's not a heart?

8. Consider drawing a card from a standard 52-card deck. Let A be the event of drawing a face card, B the event of drawing a heart, and C the event of drawing a queen. Determine the following.

(a) $p(A)$

(b) $p(A \text{ and } B)$

(c) $p(B \text{ or } C)$

(d) $p(C | A)$

(e) Are the events A and B independent? Show or explain your reasoning.

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9. A certain bus is only on time with probability $.3$. The bus is late 5 minutes with probability $.25$, 10 minutes with probability $.35$, and 5 minutes early with probability $.1$. What's the probability the bus is at least 5 minutes late exactly 5 days a week?
10. 5000 raffle tickets are sold, with many prizes available. There is 1 first prize of \$5000, 10 second place prizes of \$1000 and 25 third place prizes of \$500. All the winners will be randomly selected.
- (a) If you purchase 1 ticket, what are your expected gross winnings?
- (b) If you purchase 20 tickets, what are your expected gross winnings?