

Show your work and your reasoning by writing down comments.

1. Use the experiment of picking two cards out a deck of 52 (There are 4 suits, each containing 13 denominations, Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, and King.) to explain why $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. You are to define two events A and B and find $P(A)$, $P(B)$, $P(A \cap B)$ and $P(A \cup B)$ theoretically. Show that the equation holds true.

2. My favorite ice cream parlor has thirty-one different flavors of ice cream, seven different fruit toppings, and two different kinds of nut toppings. I want to order an ice cream sundae with two scoops of ice cream, one fruit topping, and one nut topping. (Count “vanilla, strawberry” and “strawberry, vanilla” as two different ice cream selections and allow selections like “vanilla, vanilla”.) How many ways can I order my sundae?

3. The following table gives a two-way classification of 1000 workers from a large city.

	Covered by Health Insurance	Not Covered by Health Insurance
Men	490	160
Women	220	130

Assume one worker is selected from this group. Answer the following questions.

a.) What is the probability that the worker is male?

b.) What is the probability that the worker is a male covered by health insurance?

c.) What is the probability that the worker is covered by health insurance?

d.) Are the events “male” and “covered by insurance” independent? How do you know?

e.) What is the probability that the worker is covered by health insurance given it's a male?

4. Draw and label Venn diagrams for the following sets.

a.) $A \cup B$

b.) $A \cap B$

c.) \overline{A}

5. Draw a tree diagram for the experiment of rolling a die and tossing a coin. From that, give the sample space of this experiment. Use proper set notation.

6. (Chapter 3) Find the variance and standard deviation of the following data values. Do this by hand. Show intermediate steps.

12, 16, 18, 35, 39, 45, 49, 57