

ORMS 3310 - Chapter 4 Practice Problems

1. Suppose that, from a population of 50 bank accounts, we want to take a random sample of 4 accounts in order to learn about the population. How many different random samples of 4 accounts are possible?
ANSWER: 230,300

2. Fortune magazine publishes an annual issue of the Fortune 500 companies including what state the companies are headquartered in. The states and the number of Fortune 500 companies headquartered in those states are listed in the table below. Not all 500 companies are listed below.

State	Number of Companies
New York	56
California	53
Texas	43
Illinois	37
Ohio	28
Pennsylvania	28

Using the data in the table above for the Fortune 500 companies, find the probabilities of the following events?

- a.) What is the probability that a company is headquartered in New York? **ANSWER: 11.2%**
b.) What is the probability that a company is headquartered in Texas? **ANSWER: 8.6%**
c.) What is the probability that a company is headquartered in California or Ohio? **ANSWER: 16.2%**
d.) What is the probability that a company is headquartered in Illinois and Pennsylvania? **ANSWER: 0%**
3. A university conducted a survey about what alumni think about the university. The only possible responses were no response, fell short of expectation, met expectations, or surpassed expectations. The results show that 4% of the respondents did not provide a response. 26% said that their experience fell short of expectations. And 65% said that their experience met expectations.
- a. If we chose an alumnus at random, what is the probability that the alumnus would say their experience surpassed expectations? **ANSWER: 5%**
b. If we chose an alumnus at random, what is the probability that the alumnus would say their experience met or surpassed expectations? **ANSWER: 70%**
4. A survey showed that 45.8 percent rented a car during the last 12 months for business reasons, 54% rented a car during the past 12 months for personal reasons, and 30% rented a car during the past 12 months for both business and personal reasons.
- a. What is the probability that a subscriber rented a car during the past 12 months for business or personal reasons? **ANSWER: 69.8%**
b. Given that a person rented a car for business reasons, what is the probability that the person also rented as car for personal reasons? **ANSWER: 65.50%**
5. Suppose that we have two events, A and B, with $P(A) = .50$, $P(B) = .60$, and $P(A \text{ and } B) = .40$.
- a. Find $P(A | B)$ **ANSWER: 66.67%**
b. Find $P(B | A)$ **ANSWER: 80%**
c. Are events A and B independent? **ANSWER: No, the events are not independent**

6. Let Event A consist of the numbers 1, 2, and 3. Let Event B consist of the numbers 2, 3, and 4. Assume that each number is equally likely to occur.
- What is the probability of A? **75%**
 - What is the probability of B? **75%**
 - What is the probability of A and B? **50%**
 - What is the probability of the complement of A? **25%**
7. Let A and B be two events such that $P(A \text{ or } B) = .60$, $P(A \text{ and } B) = .10$, $P(A|B) = .25$, $P(B|A) = .333$, and $P(A) = .70$. What is the probability of event A not occurring? **30%**
8. According to the U.S. Bureau of Labor Statistics, 75% of the women 25 to 49 years of age participate in the labor force. Suppose that 78% of the women in that age group are married. Suppose also that 61% of all women 25 to 49 years of age are married and participating in the labor force. What is the probability that a randomly selected woman in that age group is married or participating in the labor force? **92%**
9. A study by Hart Research Associates for the Nasdaq Stock Market revealed that 43% of all U.S. adults are stockholders. In addition, the study determined that 75% of all U.S. adult stockholders have some college education. Suppose 37% of all U.S. adults have some college education. A U.S. adult is randomly selected.
- What is the probability that the adult does not own stock? **57%**
 - What is the probability that the adult owns stock and has some college education? **32.25%**
 - What is the probability that the adult owns stock or has some college education? **47.75%**
10. The U.S. Energy Department states that 60% of all U.S. households have ceiling fans. In addition, 29% of all U.S. households have an outdoor grill. Suppose 13% of all U.S. households have both a ceiling fan and an outdoor grill. A U.S. household is randomly selected. What is the probability that the household has a ceiling fan or an outdoor grill?
76%