

PROBABILITY WORKSHEET
CTQR 150

1. If a ball is selected at random from an urn containing three red balls, two white balls, and five blue balls, what is the probability that it will be a white ball?
2. If one card is selected at random from the standard deck, what is the probability that it is a
 - a) a diamond?
 - b) a black card?
 - c) an ace?
3. What is the probability of arriving at a traffic signal when it is red if the red signal is flashed for 30 seconds, the yellow signal for 5 seconds, and the green signal for 45 seconds?
4. In roulette, the spinning wheel has 38 slots labelled with the numbers 1 through 36, 0, and 00. Each slot is equally likely. What is the probability that the ball ends up in a slot labelled with an even number other than 0 or 00?
5. The Please-Oh-Please-Buy-Some-Magazines Sweepstakes has 100,000 entries. The sweepstakes will award one grand prize, 5 first prizes, 25 second prizes, and 500 third prizes. If you have entered, what is the probability that
 - a) you win the grand prize?
 - b) you win any prize?
6. A pair of dice is cast and the numbers on the dice are added. What is the probability that
 - a) the sum is even?
 - b) the sum is either a 7 or an 11?
 - c) a pair of 1's is thrown?
 - d) a double is thrown?
 - e) one die shows a 6 and the other die a number less than 3?
 - f) the sum is at least 4?
7. You select one card at random from the standard deck. What is the probability that
 - a) you draw the king of diamonds?
 - b) you draw a diamond or a king?
 - c) you draw a face card?
 - d) you draw a red face card?
 - e) you do not draw an ace?

- f) you do not draw a black face card?
8. Four balls are selected at random without replacement from an urn containing three white balls and five blue balls. Find the probability that
- two of the balls are white and two are blue.
 - all of the balls are blue.
 - exactly three of the balls are blue.
 - two or three of the balls are white.
9. Two light bulbs are selected at random from a lot of 24 of which 4 are defective. What is the probability that at least one of the selected light bulbs is defective?
10. In cards, a 2-card hand consisting of an ace and a face card is often called Blackjack. If you are dealt 2 cards from the standard deck, what is the probability that you get Blackjack?
11. The probability that a battery will last 10 hours or more is .80 and the probability that it will last 15 hours or more is .15. What is the probability that the bulb will last 15 hours or more, given that it has lasted 10 hours?
12. At a certain medical school, $\frac{1}{7}$ of the students are from minority groups. Of those students who belong to a minority group, $\frac{1}{2}$ are African-American.
- What is the probability that a student selected at random from the student body is African-American?
 - What is the probability that a student selected at random from the student body is African-American given that the student chosen is from a minority group?
13. Three cards are drawn without replacement from the standard deck. What is the probability that the third card chosen is a diamond?
14. The accompanying data were obtained from the financial aid office of a certain university.

	Receiving Financial Aid	Not Receiving Financial Aid	Total
Undergraduates	4222	3898	8120
Graduates	1879	731	2610
Total	6101	4629	10730

- Find the probability that a student selected at random is an undergraduate.
- Find the probability that a student selected at random is receiving financial aid.
- Find the probability that a student selected at random is an undergraduate receiving aid.

- d) Find the probability that a student selected at random is receiving financial aid, given that the student is an undergraduate.
 - e) Find the probability that a student selected at random is receiving financial aid, given that the student is not an undergraduate.
 - f) Find the probability that a given student is an undergraduate, given the the student is receiving financial aid.
15. Suppose that the probability that your mail will be delivered before 2 p. m. on any day is .90. What is the probability that your mail will arrive before 2 on three consecutive days?
16. Kinko's has 4 copiers labelled A, B, C , and D . The probabilities that each of the machines will break down on a given day are

$$P(A) = \frac{1}{50}, P(B) = \frac{1}{60}, P(C) = \frac{1}{75}, P(D) = \frac{1}{40}.$$

Assuming that the machines are independent, what is the probability that on a given day

- a) all of the machines will break down?
- b) none of the machines will break down?
- c) exactly one of the machines will break down?

ANSWERS
PROBABILITY WORKSHEET

1. $\frac{1}{5}$

2. a) $\frac{1}{4}$ b) $\frac{1}{2}$ c) $\frac{1}{13}$

3. $\frac{3}{8}$

4. $\frac{9}{19}$

5. a) $\frac{1}{100000}$ b) $\frac{531}{100000}$

6. a) $\frac{1}{2}$ b) $\frac{2}{9}$ c) $\frac{1}{36}$ d) $\frac{1}{6}$ e) $\frac{1}{9}$ f) $\frac{11}{12}$

7. a) $\frac{1}{52}$ b) $\frac{4}{13}$ c) $\frac{3}{13}$ d) $\frac{3}{26}$ e) $\frac{12}{13}$ f) $\frac{23}{26}$

8. a) $\frac{C(3,2)C(5,2)}{C(8,4)} = \frac{3}{7}$ b) $\frac{C(3,0)C(5,4)}{C(8,4)} = \frac{2}{35}$ c) $\frac{C(3,1)C(5,3)}{C(8,4)} = \frac{3}{7}$

d) $\frac{C(3,2)C(5,2)}{C(8,4)} + \frac{C(3,3)C(5,1)}{C(8,4)} = \frac{1}{2}$

9. $1 - \frac{C(20,2)}{C(24,2)} = \frac{43}{138}$

10. $\frac{C(4,1)C(12,1)}{C(52,2)} = \frac{48}{1326}$

11. $\frac{.15}{.80} = \frac{3}{16}$

12. a) $\frac{1}{6}$ b) $\frac{1}{2}$

13. $\frac{1}{4}$

14. a) $\frac{8120}{10730}$ b) $\frac{6101}{10730}$ c) $\frac{4222}{10730}$ d) $\frac{4222}{8120}$ e) $\frac{1879}{2610}$ f) $\frac{4222}{6101}$

15. $(.90)^3 = .729$

16. a) $\frac{1}{9000000}$ b) $\frac{8343426}{9000000}$ c) $\frac{638371}{9000000}$