 AP Stats – Chapters 13-16

1. ***Workers.*** A company’s human resources officer reports a

 breakdown of employees by job type and gender,

 shown in the table.

 **a.** What is the probability that a worker selected

 at random is female?

**b.** What is the probability that a worker selected at

 random is female or a production worker?

**c.** What is the probability that a worker selected at random is female, if the person works in

 production?

**d.** What is the probability that a worker selected at random is a production worker, if the person is

 female?

2. ***More Workers.***Using the table from Question 1, do these data suggest that…

**a.** job type is independent of gender? Provide statistical evidence for your answer.

**b.** job type and gender are mutually exclusive? Provide statistical evidence for your answer.

3. ***Bipolar.*** Psychiatrists estimate that about 1 in 100 adults suffers from bipolar disorder.

What is the probability that in a city of 10,000 there are more than 200 people with this condition? (Be sure to verify that a Normal model can be used here.)

4. ***A Game.*** To play a game, you must pay $5 for each play. There is a 10% chance you will

win $5, a 40% chance you will win $7, and a 50% chance you will win only $3.

**a.** What are the mean and standard deviation of your net winnings?

**b.** You play twice. Assuming the plays are independent events, what are the mean and standard

 deviation of your total winnings?

5. ***Child’s Play.*** In a board game you determine the number of spaces you may move by

spinning a spinner and rolling a die. The spinner has three regions: half the spinner is marker “5,” and the other half is equally divided between “10” and “20.” The six faces of the die show 0, 0, 1, 2, 3, and 4 spots. When it’s your turn, you sin and roll, adding the numbers together to determine how far you may move.

**a.** Create a probability model for the outcome on the spinner.

**b.** Find the mean and standard deviation of the spinner results.

**c.** Create a probability model for the outcome on the die.

**d.** Find the mean and standard deviation of the die results.

**e.** Find the mean and standard deviation of the number of spaces you get to move.

6. ***Play Again.*** If you land in a Penalty Zone on the game board in Question 5, your move will be

 determined by subtracting the roll of the die from the result of the spinner. Now what are the

 mean and standard deviations of the number of spaces you get to move?

7. ***Teen Smoking.*** The Centers for Disease Control say that about 30% of high-school

students smoke tobacco (down from a high of 38% in 1997). Suppose you randomly

select high-school students to survey them on their attitudes towards scenes of smoking in movies. What is the probability that…

**a.** none of the first four students you interview is a smoker?

**b.** the first smoker is the sixth person you choose?

**c.** there are no more than two smokers among the ten people you choose?

8. ***Teen Smoking, Part II.*** Suppose that, as reported by the Centers for Disease Control, about 30% of

 high-school students smoke tobacco. You now randomly select 120 high-school students to

 survey them on their attitudes toward scenes of smoking in movies.

**a.** What is your expected number of smokers?

**b.** What is the standard deviation of the number of smokers?

**c.** The number of smokers among 120 randomly selected students will vary from group to group.

 Explain why that number can be described with a Normal model.

9. ***Random Variables.*** Given independent random variables with means and standard

deviations as shown, find the mean and standard deviation of each of the following:

**a.** X + 50

**b.** 10Y

**c.** X + 0**.**5Y

**d.** X – Y

**e.** X + X

10. ***Door Prize.*** You are among 100 people attending a charity fundraiser at which a large-

screen TV will be given away as a door prize. To determine who wins, 99 white balls and one red ball have been placed in a box and thoroughly mixed. The guests will line up and, one at a time, pick a ball from the box. Whoever gets the red ball wins the TV, but if the ball is white, it is returned to the box. If none of the 100 guests gets the red ball, the TV will be auctioned off for additional benefit of the charity.

**a.** What is the probability that the first person in line wins the TV?

**b.** You are the third person in line. What is the probability that you win the TV?

**c.** What is the probability that the charity gets to auction the TV because no one wins?

**d.** Suppose you get to pick a spot in line. Where would you want to be in order to maximize your

 chances of winning?

**e.** After hearing some protest about the plan, the organizers decide to award the prize by not

 returning the white balls to the box, thus ensuring that one of the one hundred people will

 draw the red ball and win the TV. Now what position in line would you choose in order to

 maximize your chances?