

**STA 2e: Sect. 8.1 Worksheet #1**  
**PROBABILITY DISTRIBUTIONS**

Name \_\_\_\_\_

1. A *random variable* is defined to be a variable that takes on ..... values that describe the ..... of some ..... phenomenon.
2. The *probability distribution* of a random variable gives two values: .....
3. The *sampling distribution* of a statistic tells us what ..... the statistic takes in ..... samples from the same ..... and how ..... it takes those values.

**Which of the following could be considered random variables?**

4. the number of days in a year .....
5. the number of aces in a dealt hand of 13 cards, dealt from 52 playing cards .....
6. the number of women chosen for a jury of 12 people, from a list of 200 eligible people .....
7. the number of minutes in your statistics class each period .....

**Determine which of the following could be a probability distribution. If it is not, explain why not.**

8. 

x	0	1	2	3
p	0.2	0.2	0.2	0.3

9. 

x	-2	-1	0	1	2	3
p	0.1	0.3	0.2	-0.2	0.4	0.2

.....

.....

**Find the missing probability needed in order for the distribution to be a probability distribution.**

10. 

x	0	1	2	3
p	0.125	k	0.375	0.125

11. 

x	0	1	2	3	4
p	0.1296	0.3456	0.3456	?	0.0256

k = .....

k = .....

12. 

x	-2	-1	2	5
p	k	k	0.3	0.4

13. 

x	-5	-2	0	1	3
p	k	k	k	0.17	0.32

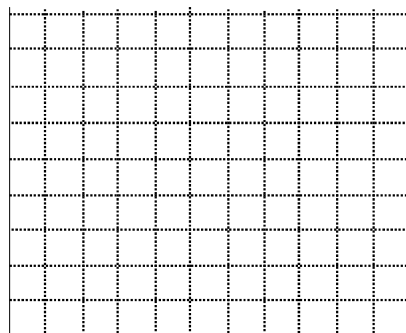
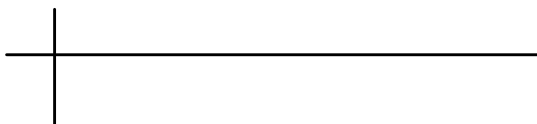
k = .....

k = .....

14. Find the expected value for #10. Show the substitutions into the formula.  
 expected value = .....
15. Find the expected value for #12. Show the substitutions into the formula.  
 expected value = .....

16. Imagine that you flip 2 coins — a penny and a nickel. Let  $T$  = number of tails showing.

- a. Explain why  $T$  is a random variable. ....
- b. Write the sample space for  $T$ . ....
- c. Display the probability distribution of  $T$  in a table.
- d. Construct a histogram that shows the probability distribution of  $T$ .



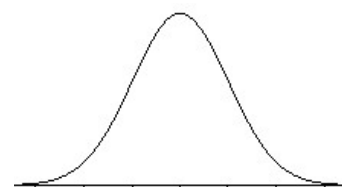
e. Find the expected value. ....

Explain what this expected value means.

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13. In a recent poll of 500 registered voters, the president was given a favorable rating by 41% of the voters. Suppose that the true proportion of all adults who give the president a favorable rating is 43%. In a large number of samples, the proportion  $\hat{p}$  who would give the president a favorable rating will be approximately normally distributed with mean 0.43 and standard deviation of 0.02.

- a. Using the values given, label the normal curve at the right with the mean and mean  $\pm$  st. dev., mean  $\pm$  2 st. dev. and mean  $\pm$  3 st. dev.
- b. What percent of many samples who favor the president will have a sample proportion between 0.39 and 0.47? (Use the 68-95-99.7 rule.)



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- c. What percent of many samples who favor the president will have a sample proportion less than 0.41? (Use the 68-95-99.7 rule.)
- d. What is the probability that  $\hat{p}$  lies between 0.37 and 0.49? (Use the 68-95-99.7 rule.)
- e. What is the probability that  $\hat{p}$  does not lie between 0.37 and 0.49?
- f. Would you be surprised if the sample proportion of those who would give the president a favorable rating was  $\hat{p} = 55\%$ ? Explain your answer.

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