

Show work for all problems. If you are using your calculator for a calculation, please write down what you entered into your calculator. No work = No partial credit.

1. The actual probability of a baby being a boy is 0.513. At a specific hospital, the Labor and Delivery department plans to monitor the genders of the next 1000 babies that are born.

a. Find the mean number of boys in randomly selected groups of 1000 babies.  $1000 \cdot 0.513$

b. Find the standard deviation for the numbers of boys born in randomly selected groups of 1000 babies.

$$\mu = 513$$

$$\sqrt{1000(.513)(.487)} = 15.8$$

c. After monitoring 1000 births, it is found that 578 are boys. Is this result "unusual"? Why or why not? Show statistical evidence of some kind to support your claim.

$$481.4 - 544.6 \text{ boys} \quad 578 \text{ is greater than 2 standard deviations}$$

2. A certain manufacturing company makes surge suppressors with a defect rate of 1%.

a. Find the probability of getting exactly two defects among 12 randomly selected surge suppressors.

$$12C_2 \cdot (.01)^2 \cdot (.99)^{10} = 0.00597$$

b. Find the probability of getting exactly two defects among 20 randomly selected surge suppressors.

$$20C_2 \cdot (.01)^2 \cdot (.99)^{18} = 0.0159$$

c. Find the probability of getting 2 or fewer defects among 10 randomly selected surge suppressors.

$$10C_0 (.01)^0 (.99)^{10} + 10C_1 (.01)^1 (.99)^9 + 10C_2 (.01)^2 (.99)^8 = 0.9996$$

d. Find the probability of getting at least 1 defect among 10 randomly selected surge suppressors.

$$1 - (10C_0 \cdot (.01)^0 (.99)^{10}) = 0.0956$$

3. A student collected the following data about her school's population. The probability of choosing a student who is 15 is 0.24, 16 is 0.25, 17 is 0.26, and 18 is 0.21. Does this data represent a probability distribution? Why or why not?

$$\text{NO, Sum is } 0.96$$

4. A die is rolled four times.

a. What is the probability you get four twos?  $(\frac{1}{6})^4$   
 $7.72 \times 10^{-4}$

b. What is the probability you get zero twos?  $(\frac{5}{6})^4 = .482$

c. What is the probability you get at least one two?  $1 - .482 = .518$

5. If a pair of dice is rolled, what is the probability the sum of the two dice is 7 or 3?

$$\frac{6}{36} + \frac{2}{36} = \frac{8}{36} = 0.222$$

6. If you are rolling a single die, what is the probability of rolling:

a. An even number

$$\frac{1}{2}$$

b. A 3 or an odd number

$$\frac{1}{6} + \frac{3}{6} - \frac{1}{6} = \frac{1}{2}$$

7. When 612 drivers were polled at the DMV about the color of the car that they drove, it was found that 203 drove red cars, 67 drove blue cars, 242 drove silver cars, 44 drove white cars, and the rest fell into the category of "other." Use these results to find the probability that:

a. A randomly selected driver drives a blue car

$$\frac{67}{612} = 0.109$$

b. A randomly selected driver drives a red or white car

$$\frac{203 + 44}{612} = 0.404$$

c. A randomly selected driver does not drive a silver car

$$1 - .404 = 0.605$$

8. A study was done in a certain part of the country where people were asked about their likelihood of purchasing an SUV as a first car or a second car. 60% of people indicated that they would purchase an SUV for their first car while 80% of people indicated that they would purchase an SUV for their second car. Use these results to find the probability that:

a. A randomly chosen person will purchase an SUV both times  $0.6(0.8) = 0.48$

b. A randomly chosen person will purchase an SUV first but some other type of car second  $0.6(0.2) = 0.12$

c. Five randomly selected people will all purchase an SUV for their first car  $0.6^5 = 0.0778$

9. A person is randomly selecting digits from 0-9. What is the probability that:

a. A person selects a 7 followed by an odd number if numbers are not allowed to be repeated?

$$1 \cdot 4 / 90 = 0.044$$

b. A person selects a 7 followed by an odd number if numbers are allowed to be repeated?

$$1 \cdot 5 / 100 = 0.05$$

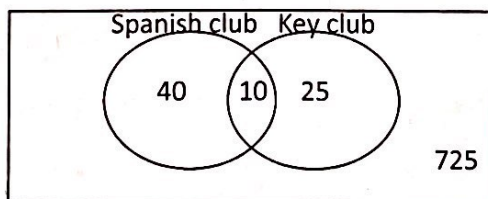
c. A person selecting only one number chooses an odd number or a number less than 6?

$$(5 + 6 - 3) / 10 = 8 / 10 = 0.8$$

d. A person selecting three numbers chooses at least one 4 if the numbers are allowed to be repeated?

$$1 - (.9 \cdot .9 \cdot .9) = 0.271$$

10. There are 800 students at Centerfield High School and their involvement (or non-involvement) in two particular clubs is shown in the Venn diagram below.



a. If a student from the high school is picked at random, what is the probability that student is in Spanish club and key club?

$$10 / 800 = 0.0125$$

b. If a student from the key club is picked at random, what is the probability that student is in the Spanish club?

$$10 / 35 = 0.286$$

c. If two students from the high school are picked at random, what is the probability that neither student is involved in the Spanish club or the key club?

$$\frac{725}{800} \cdot \frac{724}{799} = 0.821$$