

1. Identify the type of sample described. Then tell if the sample is biased and explain why or why not.

- A. Convenience B. Self-Selected C. Systematic D. Random E. Clustered F. Stratified

C A survey is being conducted to determine if residents want to raise property taxes to increase school system revenues. The county surveys every 4th person that enters the County Fair.

A A survey is being conducted to determine if residents of Cobb County want to add a traffic light at the rear entrance of Lassiter HS. The survey is given to the first 1,500 people that attend the Lassiter vs. Pope Football game.

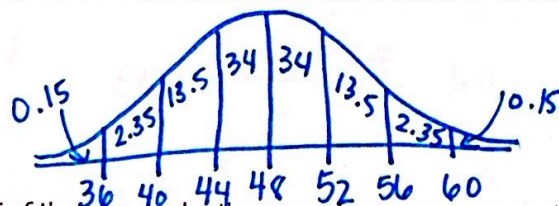
F A survey is given regarding students favorite lunch line. Students are randomly selected from the freshmen class, sophomore class, junior class and senior class.

B A survey is being conducted to determine if students would like to have prom at Lassiter HS instead of an off campus site. The survey sheets are left at the front office for volunteers to pick up if they want to participate in the survey.

E A survey is given regarding their favorite class at Lassiter. All Juniors and all Seniors are selected to take the survey.

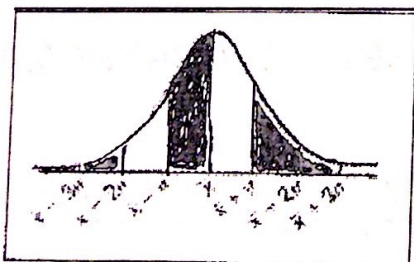
D A survey is conducted to determine if residents of Cobb Co. would want a running/walking trail built in the East Cobb area. Residents are called at random to determine what residents would like.

2. Draw a normal curve for a normal distribution with a mean of 48 and a standard deviation of 4. Label all areas under the curve.



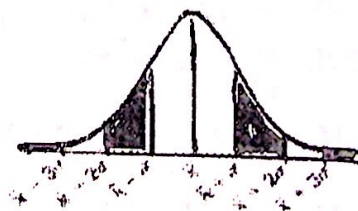
Give the PERCENT of the area under the normal curve represented by the shaded area

1. 52.35%



$$0.15 + 2.35 + 34 + 13.5 + 2.35 = 52.35\%$$

2. 27.3%



$$0.15 + 13.5 + 13.5 + 0.15 = 27.3\%$$

5. 400 students out of 2,000 at a school are surveyed. 50 said they play a sport at the high school. Predict the number of students in the population (the entire school) that would answer similarly.

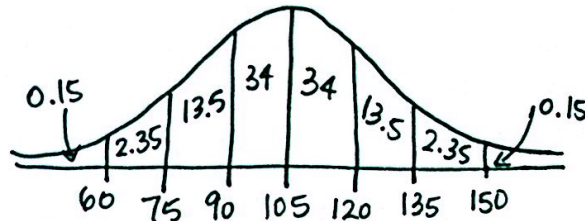
$$\frac{50}{400} = \frac{x}{2000}$$

$$100000 = 400x$$

$$\boxed{250 = x}$$

6. Given the following information: a normal distribution has a mean of 105, and a standard deviation of 15.

a. Draw and clearly label the model.



b. What PROBABILITY:

a. Between 60 & 90

$$2.35 + 13.5 = 15.85\%$$

$$\boxed{0.1585}$$

b. At least 90

$$34 + 34 + 13.5 + 2.35 + 0.15 = 84\% = \boxed{0.84}$$

c. between 75 and 135

$$13.5 + 13.5 + 34 + 34 = 95\% = \boxed{0.95}$$

d. at most 120

$$0.15 + 2.35 + 13.5 + 34 + 34 = 84\% = \boxed{0.84}$$

e. is less than 54

$$\text{normalcdf}(-9999, 54, 105, 15) = \boxed{0.000337}$$

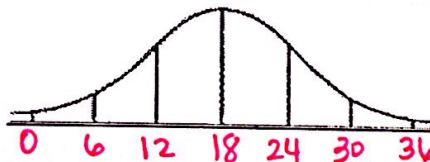
f. at least 48

$$\text{normalcdf}(48, 9999, 105, 15) = \boxed{0.9999}$$

$$z = \frac{54 - 105}{15} = -3.4 \quad \boxed{0.0003}$$

$$z = \frac{48 - 105}{15} = -3.8 \quad \leftarrow \text{Not on table}$$

7. Each year high school students take the ACT to seek admission to college. A mean test score in 2011 was 18 and the standard deviation is 6.



a. What is the PERCENT of students that score above a 32?

$$\text{normalcdf}(32, 9999, 18, 6)$$

$$0.0098 = \boxed{0.98\%}$$

$$\text{OR } z = \frac{32 - 18}{6} = 2.33$$

$$1 - 0.9901 = 0.0099 = \boxed{0.99\%}$$

b. What is the PERCENT of students that score between 17 & 25?

$$\text{normalcdf}(17, 25, 18, 6)$$

$$0.4445 = \boxed{44.45\%}$$

OR

$$z = \frac{17 - 18}{6} = -0.17$$

$$z = \frac{25 - 18}{6} = 1.17$$

c. What is the PERCENT of students that score at least 22?

$$\text{normalcdf}(22, 9999, 18, 6)$$

$$0.2525 = \boxed{25.25\%}$$

$$\text{OR } z = \frac{22 - 18}{6} = 0.67$$

$$0.9790 - 0.4325 = 0.4465 = \boxed{44.65\%}$$

$$1 - 0.7486 = 0.2514 = \boxed{25.14\%}$$

d. What is the PERCENT of students that score at most 26?

$$\text{normalcdf}(-9999, 26, 18, 6)$$

$$0.9088 = \boxed{90.88\%}$$

$$\text{OR } z = \frac{26 - 18}{6} = 1.33$$

$$0.9082 = \boxed{90.82\%}$$

8. **Test Comparison:** The SAT math section has a mean of 500 and a standard deviation of 100. The ACT math section has a mean of 18 and a standard deviation of 6. Cade took both the SAT and the ACT in the fall. He made a 670 on the math section of the SAT. He made a 29 on the math section of the ACT. Which test did he perform better on the math section?

$$\text{SAT: } \mu = 500$$

$$\sigma = 100$$

$$X = 670$$

$$\text{ACT: } \mu = 18$$

$$\sigma = 6$$

$$X = 29$$

$$\text{SAT } z = \frac{670 - 500}{100} = 1.7$$

$$\text{ACT } z = \frac{29 - 18}{6} = 1.83$$

ACT

9. The mean test score on a Economics test was a 79 with standard deviation of 3. How many standard deviations from the mean is a test score of a 85?

$$z = \frac{85 - 79}{3} = \boxed{2}$$

10. **Light Bulbs** — On average, a light bulb is a normal distribution and has a mean of 550 hours with a standard deviation of 70.5 hours. If Home Depot on Dallas Highway has 5,000 light bulbs in stock, then:

a. How many light bulbs would last longer than 690 hours?

$$\text{Normalcdf}(690, 9999, 550, 70.5)$$

$$0.0235(5000) = 117.6 \quad \boxed{117}$$

$$\text{OR } z = \frac{690 - 550}{70.5} = 1.99 \quad 1 - 0.9767 =$$

$$0.0233(5000) =$$

b. How many light bulbs would last less than 450 hours?

$$\text{Normalcdf}(-9999, 450, 550, 70.5)$$

$$0.0780(5000) = \boxed{390}$$

$$\text{OR } z = \frac{450 - 550}{70.5} = -1.42$$

$$116.5$$

$$\boxed{117}$$

c. How many light bulbs would last between 425 hours and 710 hours?

$$0.0778(5000) = \boxed{389}$$

$$\text{Normalcdf}(425, 710, 550, 70.5)$$

$$0.9503(5000) = 4751.5$$

$$\boxed{4751}$$

OR

$$z = \frac{425 - 550}{70.5}$$

$$z = \frac{710 - 550}{70.5}$$

$$z = -1.71$$

$$z = 2.27$$

$$0.9884 - 0.0384 = 0.95$$

$$0.95(5000) = \boxed{4750}$$

11. You want to find the mean salary of NCAA Division 1 college football coaches. You obtain the salaries of a random sample of 100 coaches. The sample mean is \$1,500,000 with a standard deviation of \$200,000.

a. Find the 95% confidence interval for the above data.

$$1500000 \pm 1.96 \left(\frac{200000}{\sqrt{100}} \right) = 1500000 \pm 39200 = [\$1460800, \$1539200]$$

b. Find the 99% confidence interval for the above data.

$$1500000 \pm 2.575 \left(\frac{200000}{\sqrt{100}} \right) = 1500000 \pm 51500 = [\$1448500, \$1551500]$$

c. As the margin of error increases, what happens to the "SPREAD" of the confidence interval?

Increases

12. You want to determine the average daily cell phone usage for teenagers. You obtain the cell phone usage of a random sample of 400 high school students in Cobb County. The sample mean is 240 minutes daily with a standard deviation of 40 minutes.

a. Given 90% confidence interval, find the Margin of Error.

$$ME = \pm 1.645 \left(\frac{40}{\sqrt{400}} \right) = \pm 3.29$$

b. Find the 90% confidence interval for the above data.

$$240 \pm 3.29 = [236.71, 243.29]$$