z-scores

*Finding Area*   In Exercises 21–36, find the indicated area under the standard normal curve.

25. To the left of $z = -2.575$

26. To the left of $z = -3.08$

27. To the right of $z = 1.645$

28. To the right of $z = 2.51$

29. Between $z = 0$ and $z = 1.96$

30. Between $z = 0$ and $z = 3.09$

31. Between $z = -1.53$ and $z = 0$

32. Between $z = -0.51$ and $z = 0$

35. To the left of $z = -2.97$ or to the right of $z = 1.66$

36. To the left of $z = -0.84$ or to the right of $z = 2.81$

2.) The mean of a recent math test is 76.2 with a standard deviation of 5.7.

   a)   Tammy scored a 72 on that test. What is her z-score? (4 decimal places)

   b)   Suppose Jacob has a z-score of 1.52. What was his actual test score?

   c)   What **percent** of the students' scores were lower than 60? (Hint: z-score formula will help you)

Empirical Rule

Suppose the female mean height is 64 in and the standard deviation is 2.75 in. Draw the bell shape distribution labeling all characteristics (Percentages and Standard Deviations).
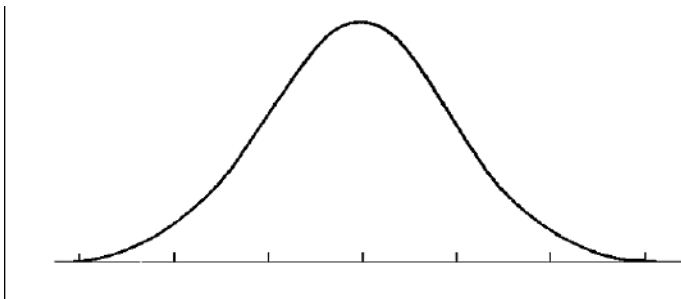
   1.   What % fall between 58.5 and 69.5?

   2.   What % fall between 69.5 and 72.25?

   3.   What % is greater than 72.25?

   4.   What is the range of heights that are in the 95%?

   5.)   If 5000 women were surveyed how many would fall in the 68% ?

Central Limit Theorem In Exercises 1 – 2, determine if the Central Limit Theorem applies. If it does, find the mean and standard error of the mean for the sampling distribution described. Round all answers to the nearest hundredth (2 decimal places)

1) The mean salary of police officers in Metro Atlanta is $53,000 with a standard deviation of $3200. Multiple random samples of 40 police officers were drawn from the population.

2) The consumption of processed fruits by Americans averages 154.8 pounds. The standard deviation is 51.6 pounds. Random samples of 21 Americans are taken from the population.

CLT /Probability of Sample Means

1. Credit card balances are normally distributed with a mean of $2870 and a standard deviation of $900.
   a. What is the probability that a randomly selected credit card holder has a credit card balance less than $2500?

   b. You randomly select 25 credit card holders. What is the probability that their mean credit card balance is less than $2500?

2. The average labor costs for car repairs for a large chain of car repair shops is $48.25. The standard deviation is $4.25. Assume the variable is normally distributed.

   a. If a store is selected at random, find the probability that the labor cost will range between $46 and $48.

   b. If 20 stores are selected at random, find the probability that the mean of the sample will be between $46 and $48.

   c. Use the information from b to find the probability that the mean is greater than $48.

CI with Means

1.   A production manager knows that historically, the amounts of impurities in bags of a chemical follow a normal distribution with a standard deviation of 3.8 grams. A random sample of nine bags of the chemical yielded the following amounts of impurities in grams:

$$18.2 \quad 13.7 \quad 15.9 \quad 17.4 \quad 21.8 \quad 16.6 \quad 12.3 \quad 18.8 \quad 16.2$$

   Find a 90% confidence interval for the population mean weight of impurities.

2. A random sample of 1,562 undergraduates enrolled in marketing courses was asked to respond on a scale from one (strongly disagree) to seven (strongly agree) to the statement: "Most advertising insults the intelligence of the average customer." The sample mean response was 3.92 and the sample standard deviation was 1.57.

   (a)   Find a 90% confidence interval for the population mean response.

   (b)   Without doing the calculations, state whether an 80% confidence interval for the population mean would be wider than, narrower than, or the same as (a).

CI with proportions

7. Gina has found that out of a sample of 350 students that 112 claim that blue is their favorite color. Create a 99% confidence interval to estimate the TRUE proportion of all students that claim blue is their favorite color.

8. According to a study, 52.5% of a sample of 2000 Americans still prefer Facebook for social media over other options. Create a 95% confidence interval to estimate the TRUE proportion of all Americans that prefer Facebook over other social media sites.

Margin of Error/Sample Size

9. Fill in the blanks with one of the following: *increases, decreases,* or *stays the same* where

$$E = z * (\frac{\sigma}{\sqrt{n}}).$$

    a) As the sample size (n) increases, the margin of error (E) _____.

    b) As the confidence level (C) increases, the margin of error (E) _____.

    c) As the standard deviation (σ) increases, the margin of error (E) _____.

10. Hannah wishes to create a 95% confidence interval to estimate the proportion of Henry County students that like the school lunches. What sample size must she choose to accurately estimate the proportion within 2% of the TRUE proportion if she assumes $\hat{p}$ is 50%?

11. Kyle wants to estimate the average amount of money that hunters spend on supplies during hunting season within $30.00 using a 90% confidence interval. If the standard deviation is given as $40, what sample size will Kyle have to use get an accurate estimate?