Unit 2 Review

1. Using the curve below, which segment represents the median? Mean?

   Line A = Mean
   Line B = Median

2. Using your calculator, find the mean, standard deviation, and the five-number summary of the following:

   \[\begin{align*}
   12 & \quad 16 & \quad 3 & \quad 6 & \quad 13 & \quad 19 & \quad 21 & \quad 7 & \quad 8 & \quad 8 & \quad 10 & \quad 2 & \quad 15 \\
   \text{(x) Mean} &= \frac{108}{15} = 7.2 \\
   \text{(s)} \text{ St. Dev.} &= 5.9 \\
   \text{Min} &= 2 \\
   Q_1 &= 6.5 \\
   Q_2 &= 10 \\
   Q_3 &= 15.5 \\
   \text{Max} &= 21
   \end{align*}\]

   Percentiles and Z-Score

3. Gabby is in the 68th percentile for height compared to girls her age. Explain what this means.

   68% of girls her age are as tall or shorter than her.

4. What is the formula for z-score?

   \[Z = \frac{x - \bar{x}}{s_x}\]

5. Gabby’s weight has a \( z = -1.56 \). Explain what this means.

   Gabby’s weight is 1.56 standard deviations below the mean.

6. Based on the dotplot to the right, answer the following questions:

   a) What is the approximate percentile for the student who scored a 65? Explain what this value means.

   \[\frac{5}{15} = 0.33\]
   33rd Percentile
   33% of the class scored a 65 or lower on the test.

   b) Find the z-score for the student who scored an 85 given the mean is 73 and the standard deviation is 14. Explain what this value means.

   \[Z = \frac{85 - 73}{14} = 0.86\]
7. Bjorn made a 60 on his economics test. The distribution of economic scores has a mean of 72 and a standard deviation of 7. Alex made an 82 on his government test. The distribution of government scores has a mean of 96 and a standard deviation of 6. Who did better in comparison to their class? Explain.

Bjorn: \[
Z = \frac{60 - 72}{7}
\]
\[
Z = -1.71
\]

Alex: \[
Z = \frac{82 - 96}{6}
\]
\[
Z = -2.33
\]

* Bjorn did better b/c his z-score was higher.

Empirical Rule (68-95-99.7 Rule)

8. Complete the following normal curve using the empirical rule.

9. A normal distribution has a mean of 25 and a standard deviation of 5. Find the area under the curve for the following intervals:
   a. Between 20 and 30
   
   \[
   68\%
   \]
   
   b. Greater than 20
   
   \[
   84\%
   \]
   
   c. Below 30
   
   \[
   84\%
   \]

10. A set of data has a normal distribution with a mean of 5.1 and a standard deviation of 0.9. Find the percent of data within each interval.
   a. Between 4.2 and 6.0
   
   \[
   68\%
   \]
   
   b. 95% of the data lies between \(3.3\) and \(6.9\).
   
   c. Less than 4.2
   
   \[
   10\%
   \]
   
   d. The value that separates the highest 2.5% of data.
   
   \(6.9\)
Normal Standard Table

11. Find the probability using the z-score and normal table. Shade the appropriate area under the normal curve for each.
   a) \(-1.78 < z < 2.62\)
      \[ Tbl = .0375 \quad Tbl = .9956 \]
      \[ .9956 - .0375 = .9581 \]
      \[ 95.81\% \]
   b) \(z > 0.34\)
      \[ Tbl = .6331 \]
      \[ 1 - .6331 = 0.3669 \]
      \[ 36.69\% \]

12. The height of the students in Mrs. Brattebo’s class has a mean of \(\bar{x}\) inches and a standard deviation of 1.3 inches. Assuming these heights follow a normal distribution find the following:
   a. What percentage of students have a height less than 63 inches?
      \[ Z = \frac{63 - \bar{x}}{1.3} = -2.31 \]
      \[ Tbl = .0104 \]
      \[ 1.04\% \]
   b. What percentage of students have a height greater than 69 inches?
      \[ Z = \frac{69 - \bar{x}}{1.3} = 2.31 \]
      \[ Tbl = .9896 \]
      \[ 1 - .9896 = .0104 \]
      \[ 1.04\% \]
   c. What percentage of students have a height between 62 and 67 inches?
      \[ Z = \frac{62 - \bar{x}}{1.3} = -3.08 \]
      \[ Z = \frac{67 - \bar{x}}{1.3} = 0.77 \]
      \[ Tbl = .0010 \]
      \[ Tbl = .7794 \]
      \[ .7794 - .0010 = .7784 \]
      \[ 77.84\% \]
   d. Mrs. Brattebo wants to bring a group of students on a field trip. Unfortunately, only students below 63 inches can fit on the bus. If there are 246 seniors taking statistics, HOW MANY students can go on the field trip?
      \[ \% (\text{Total}) = .0104 (246) = 2.55 \rightarrow 3 \text{ students} \]

13. For the following use the normal standard table to find the z-score.
   a. Below 32.64% \( (Z < 32.64\%) \)
      \[ \frac{32.64}{100} = .3264 \]
      \[ Z = -0.45 \]
   b. Above 10.56% \( (Z > 10.56\%) \)
      \[ \frac{10.56}{100} = .1056 \]
      \[ Z = 1.25 \]
      \[ 1 - .1056 = .8944 \]
      \[ Tbl \]
   c. The 78th percentile (less than)
      \[ Tbl = .7800 \]
      \[ Z = 0.77 \]
   d. The top 6% \( (Z > 6\%) \)
      \[ \frac{6}{100} = .0600 \]
      \[ 1 - .0600 = 0.9400 \]
      \[ Tbl \]
      \[ Z = 1.55 \]
      \[ Z = 1.56 \]
      \[ Z = 1.555 \]
14. Scores on the SAT follow a normal distribution with mean 452 and standard deviation 18. Michael's z-score is 1.34. What is his actual SAT score?

\[
\frac{2.412 - 452}{18} = \frac{x - 452}{18}
\]

\[
x = 474.012
\]

15. The unit 2 statistics test has a mean of 75 and a standard deviation of 4.7. Your score is in the bottom 25% of the class. What is your actual test score?

\[
\frac{25}{100} = 0.2500
\]

\[
(4.7) - 0.67 = \frac{x - 75}{4.7}
\]

\[
x = 71.851
\]

16. The average amount of sodium in a fast food chicken sandwich is normal distributed with a mean of 964 mg and a standard deviation of 123 mg. A Popeye's chicken sandwich claims to be in the top 74.86% for sodium amount. What is the actual amount of sodium in a Popeye's chicken sandwich?

\[
\frac{74.86}{100} = 0.7486
\]

\[
(123)(-0.67) = \frac{x - 964}{123}
\]

\[
x = 881.59 mg.
\]