Assume every situation is an approximately normal population. You must draw a picture for every problem.

1. A group of students had an average SAT score of 550 with a standard deviation of 12. What score would be required to be in the top 10%?
   \[
   X \sim N(550, 12)
   \]
   \[
   \text{invnorm}(0.9) = 1.282
   \]
   \[
   1.282 = x - 550
   \]
   \[
   x = 565.4 \rightarrow 566
   \]

3. Humans now have an average life span of 77.6 years with a 7 year standard deviation. At what age has a person out-lived 85% of the population?
   \[
   X \sim N(77.6, 7)
   \]
   \[
   \text{invnorm}(0.85) = 8.416
   \]
   \[
   8.416 = x - 77.6
   \]
   \[
   x = 86.16 \text{ or } 84 \text{ years}
   \]

5. The average number of unpopped kernels of corn of a particular popcorn brand is 41 with a standard deviation of 9. Your bag is in the 23rd percentile. How many kernels did not pop?
   \[
   X \sim N(41, 9)
   \]
   \[
   \text{invnorm}(0.23) = -1.778
   \]
   \[
   -1.778 = x - 41
   \]
   \[
   x = 34.4 \text{ or } 34 \text{ kernels}
   \]

7. Seventeen percent of a group of people are over 72 inches tall. The standard deviation of this group is 2.5 inches. What is the average height?
   \[
   X \sim N(-1, 2.5)
   \]
   \[
   \text{invnorm}(0.17) = -1.952
   \]
   \[
   -1.952 = x - 1
   \]
   \[
   x = 0.049 \text{ or } 0.05 \text{ inches}
   \]

9. A bag of M&M's is supposed to average 28 candies. If the standard deviation is 3, how many candies does a bag contain if it is in the top 5% of all bags?
   \[
   X \sim N(28, 3)
   \]
   \[
   \text{invnorm}(0.95) = 1.645
   \]
   \[
   1.645 = x - 28
   \]
   \[
   x = 32.9
   \]

11. A particular breed of dog has an average weight of 72 pounds with a standard deviation of 9 pounds. What is the range of weight for the middle 75% of all dogs?
   \[
   X \sim N(72, 9)
   \]
   \[
   \text{invnorm}(0.25) = 1.15
   \]
   \[
   -1.15 = x - 72
   \]
   \[
   x = 60.8 \text{ or } 61 \text{ pounds}
   \]

13. A basketball player makes an average of 16 points per game with a standard deviation of 5.2. What is the probability that she will score over 30 points in a single game?
   \[
   X \sim N(16, 5.2)
   \]
   \[
   \text{Range for mid 75%}
   \]
   \[
   X \sim N(72, 9)
   \]
   \[
   \text{invnorm}(0.15) = -1.04
   \]
   \[
   -1.04 = x - 28
   \]
   \[
   x = 26.96 \text{ or } 27 \text{ points}
   \]

12. A basketball player makes an average of 16 points per game with a standard deviation of 5.2. What is the probability that she will score over 30 points in a single game?
   \[
   X \sim N(16, 5.2)
   \]
   \[
   X \sim N(16, 5.2)
   \]
   \[
   \text{Range for mid 75%}
   \]
   \[
   X \sim N(72, 9)
   \]
   \[
   \text{invnorm}(0.25) = 1.15
   \]
   \[
   -1.15 = x - 72
   \]
   \[
   x = 60.8 \text{ or } 61 \text{ pounds}
   \]

14. The average typing speed of a group of people is 58 words per minute. The standard deviation is 17 words per minute. What is the IQR of this situation?
   \[
   X \sim N(58, 17)
   \]
   \[
   \text{invnorm}(0.25) = -1.96
   \]
   \[
   -1.96 = x - 58
   \]
   \[
   x = 41.5
   \]

16. A boss expects the average time needed to complete a project to be 22 hours. Sixty-eight percent of the time it takes between 20 – 24 hours to complete. What is the probability it will take you more than 25.5 hours?
   \[
   X \sim N(22, 2)
   \]
   \[
   \text{invnorm}(0.84) = 1.15
   \]
   \[
   1.15 = x - 22
   \]
   \[
   x = 23.15
   \]

18. The average person blinks their eyes 17,000 times a day. Ninety-five percent of people blink between 15,000 – 19,000 times a day. What is the IQR of blinking?
   \[
   X \sim N(17,000, 1,000)
   \]
   \[
   \text{invnorm}(0.95) = 2.33
   \]
   \[
   2.33 = x - 17,000
   \]
   \[
   x = 16,774
   \]

20. A basketball player makes an average of 16 points per game with a standard deviation of 5.2. What is the probability that she will score over 30 points in a single game?
   \[
   X \sim N(16, 5.2)
   \]
   \[
   \text{Range for mid 75%}
   \]
   \[
   X \sim N(72, 9)
   \]
   \[
   \text{Range for mid 75%}
   \]
   \[
   X \sim N(72, 9)
   \]
   \[
   \text{Range for mid 75%}
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   \]
   \[
   \text{Range for mid 75%}
   \]
   \[
   X \sim N(72, 9)
   \]
   \[
   \text{Range for mid 75%}
   \]
13. Again with the basketball player, what is the minimum amount of points the coach can expect from this player 75% of the time? $X \sim N(11.2, 5)$.

15. A batting average of .228 puts you in the 35th percentile while a batting average of .303 puts you in the 91st percentile. What is the standard deviation and mean batting average?

17. The mean number of goldfish crackers in the “Extreme Cheddar” package is 325 with a standard deviation of 6. What percentage of the bags have less than 310 goldfish?

19. An Algebra class took a test and had an average of 82. Normen’s score of 91 put him in the 97th percentile. What was the standard deviation of this test?

21. A group of kids can run a mile in an average of 8 minutes with a standard deviation of 1.5 minutes. To qualify for the track team you have to be in the top 20%. How fast do you have to run the mile?

23. Mary has a z-score of 2.1 and a raw score of 55. Mike has a z-score of 1.8 and a raw score of 50. What is the average and standard deviation of this group of people?

24. Eighteen percent of people watch less than 3 hours of TV per week. Twenty-two percent of people watch more than 20 hours of TV per week. What is the average and standard deviation of TV watching?
15 (continued)

\[ \sigma = 0.3853 = \frac{228 - \mu}{\sigma} \]
\[ 1.341 = 0.303 - \mu \]
\[ -0.3853 \sigma = 228 - \mu \]
\[ 1.341 \sigma = 0.303 - \mu \]
\[ 1.7263 \sigma = 0.075 \]
\[ \frac{1.7263}{1.7263} \]
\[ \sigma = 0.043 \]

\[ 1.341(0.043) = 0.303 - \mu \]
\[ 0.0577 = 0.303 - \mu \]
\[ -0.2453 = -\mu \]
\[ 0.245 = \mu \]