Week Two Homework

https://openstax.org/books/introductory-statistics/pages/6-practice
6.1 25, 26, 27, 28

25.

Suppose a normal distribution has a mean of six and a standard deviation of 1.5. What is the *z*-score of *x* = 5.5?

ANSWER: Z-score = -0.33

$$z = \frac{5.5 - 6}{1.5} = -0.33$$

26.

In a normal distribution, *x* = 5 and *z* = –1.25. This tells you that *x* = 5 is ____ standard deviations to the ____ (right or left) of the mean.

ANSWER: This tells you that *x* = 5 is 1.25 standard deviations to the left of (or below) the mean.

27.

In a normal distribution, *x* = 3 and *z* = 0.67. This tells you that *x* = 3 is ____ standard deviations to the ____ (right or left) of the mean.

ANSWER: This tells you that *x* = 3 is 0.67 standard deviations to the right of (or above) the mean.

28.

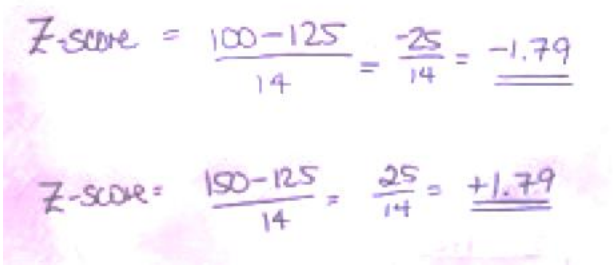
In a normal distribution, *x* = –2 and *z* = 6. This tells you that *x* = –2 is ____ standard deviations to the ____ (right or left) of the mean.

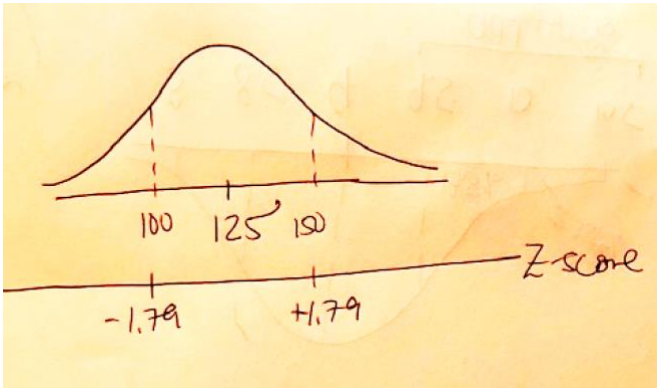
ANSWER: This tells you that *x* = –2 is 6 standard deviations to the right of (or above) the mean.

https://openstax.org/books/introductory-statistics/pages/6-homework
6.1 Homework 64, 65, 66, 67

64. The systolic blood pressure (given in millimeters) of males has an approximately normal distribution with mean $\mu = 125$ and standard deviation $\sigma = 14$. Systolic blood pressure for males follows a normal distribution.

a. Calculate the *z*-scores for the male systolic blood pressures 100 and 150 millimeters.





b. If a male friend of yours said he thought his systolic blood pressure was 2.5 standard deviations below the mean, but that he believed his blood pressure was between 100 and 150 millimeters, what would you say to him?

No, male BP levels between 100 and 150 are between -1.79 and +1.79 z-scores which means between 1.79 standard deviations below the mean BP and 1.79 standard deviations above the mean BP of 125. If the friend's BP was really 2.5 standard deviations below, then it would be lower than 100.

65. Kyle's doctor told him that the *z*-score for his systolic blood pressure is 1.75. Which of the following is the best interpretation of this standardized score? The systolic blood pressure (given in millimeters) of males has an approximately normal distribution with mean $\mu = 125$ and standard deviation $\sigma = 14$. If X = a systolic blood pressure score then $X \sim N(125, 14)$.

a. Which answer(s) **is/are** correct?
   i. Kyle's systolic blood pressure is 175. INCORRECT
   ii. Kyle's systolic blood pressure is 1.75 times the average blood pressure of men his age. INCORRECT, it's a location not a multiplier.
   iii. Kyle's systolic blood pressure is 1.75 above the average systolic blood pressure of men his age. INCORRECT, this is incorrect because there was no mention of the mean being for Kyle's age.

iv. Kyles's systolic blood pressure is 1.75 standard deviations above the average systolic blood pressure for men. CORRECT…this is exactly what the z-score means for these data

b. Calculate Kyle's blood pressure. ANSWER: 149.5

$$1.75 = \frac{X - 125}{14}$$

$$(1.75)(14) = X - 125$$

$$(1.75)(14) + 125 = X$$

149.5 = X

66. Height and weight are two measurements used to track a child's development. The World Health Organization measures child development by comparing the weights of children who are the same height and the same gender. In 2009, weights for all 80 cm girls in the reference population had a mean μ = 10.2 kg and standard deviation σ = 0.8 kg. Weights are normally distributed. $X \sim N(10.2, 0.8)$. Calculate the *z*-scores that correspond to the following weights and interpret them.

a. 11 kg ANSWER: An 80cm girl who weighs 11 kg is 1 standard deviation above the mean weight for this reference population, 10.2 kg.

$$z = \frac{11 - 10.2}{0.8} = 1.00$$

b. 7.9 kg ANSWER: An 80cm girl who weighs 7.9 kg is 2.88 standard deviation below the mean weight for this reference population, 10.2 kg.

$$z = \frac{7.9 - 10.2}{0.8} = -2.88$$

c. 12.2 kg ANSWER: An 80cm girl who weighs 12.2 kg is 2.5 standard deviation above the mean weight for this reference population, 10.2 kg.

$$z = \frac{12.2 - 10.2}{0.8} = 2.50$$

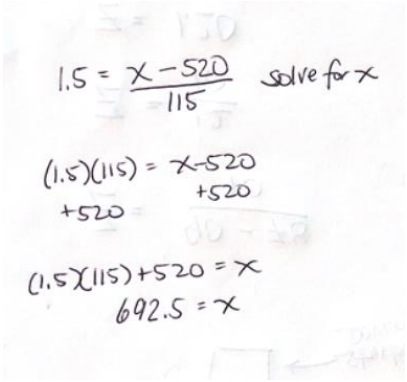
67. In 2005, 1,475,623 students heading to college took the SAT. The distribution of scores in the math section of the SAT follows a normal distribution with mean μ = 520 and standard deviation σ = 115.

a. Calculate the *z*-score for an SAT score of 720. Interpret it using a complete sentence.

A 720 score on the math section is 1.74 standard deviation above the mean SAT score of 520.

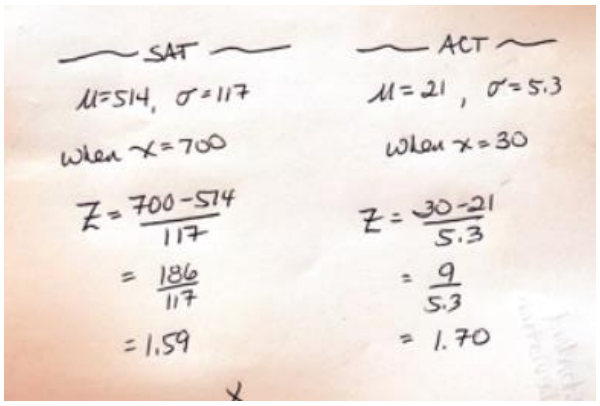
$$z = \frac{720 - 520}{115} = 1.74$$

b. What math SAT score is 1.5 standard deviations above the mean? What can you say about this SAT score?



The exam score of 692.5 is 1.5 standard deviations above the mean of 520.

c. For 2012, the SAT math test had a mean of 514 and standard deviation 117. The ACT math test is an alternate to the SAT and is approximately normally distributed with mean 21 and standard deviation 5.3. If one person took the SAT math test and scored 700 and a second person took the ACT math test and scored 30, who did better with respect to the test they took?



With respect to the test they took, the person who took the ACT did better (has the higher *z*-score).