Homework 2 Chapter 5

Due on February 24

Math 125 *Kovitz* Spring 2025

The key problems are problems 1, 2, 8, 11, 12, and 13.

Problems 7, 8, 14 (b), and 15 might prove to be the most challenging.

1. Fill in the blank: A value is converted to standard units by seeing how many _____s it is above or below the average.

   If the value is above the average, its standard units are _____ .

   If the value is below the average, its standard units are _____ .

   If the value is at the average, its standard units equals _____ .

2. On a certain exam, the average of the scores was 72 and the SD was 15.

   (a) Convert each of the following scores to standard units: 90, 45, 75.

   (b) Find the scores which in standard units are: 0, +1.4, −2.2.

3. (a) Convert each entry on the following list to standard units (that is, using the average and SD of the list): 9, 12, 17, 20, 21, 23.

   (b) Find the average and SD of the converted list.

4. True or false.

   Since the area between −1.5 and +1.5 under the normal curve is about 86.6%, the area between −0.75 and +0.75 under the normal curve can be estimated to be about 43.3%.

5. True or false.

   Since the area between −0.10 and +0.10 under the normal curve is about 8%, the area between −0.10 and 0 under the normal curve can be estimated to be about 4%.

6. Find the area (to the nearest percent) under the standard normal curve between:

   (a) −1.35 and −0.25.

   (b) −1.35 and +0.25.

   (c) −0.25 and +0.25.

   (d) How are the areas in the three parts related?
   Suggestion: draw the 3 regions and answer the question based on their size and shape.

7. The area under the normal curve between −0.35 and what other number is equal to 49%?

8. The weights of a group of men followed the normal curve with an average of 162 pounds and an SD of 24 pounds.

   Half of those men weighed between 138 pounds and _____ pounds.

   Give an answer, rounded to the nearest whole number of pounds.

   (Hint: First find the percentage of weights between 138 and 162 pounds.)

9. The heights of a group of 2,500 men followed the normal curve with an SD of 4 inches.

   (a) About what percent of the men had heights 7 inches or more away from the average?

   (b) About how many men is that?

10. (a) The area under the normal curve between $\pm z$ is 92%. Find z.
    (b) The area under the normal curve to the left of z is 92%. Find z.
    (c) Explain why the answers to parts (a) and (b) are not the same.

11. The heights of a large group of women averaged about 66 inches, with an SD of about 2.5 inches. Using the normal curve, estimate the percentage of women with heights—
    (a) below 69 inches.
    (b) between 64 inches and 69 inches.
    (c) above 71.5 inches.

12. In 1974, Math SAT scores averaged 500 points, with an SD of about 100 points. The histogram of the scores followed the normal curve reasonably well.
    (a) About what percentage of the scores were below 485 points?
    (b) One test-taker scored 1.30 SDs above on the Math SAT. About what percentage of test-takers had lower scores than he did?

13. Among freshmen at a certain university, scores on the Math SAT followed the normal curve, with an average of 590 and an SD of 100. Fill in the blanks; explain briefly.
    (a) A student who scored 415 points on the Math SAT was at the ____th percentile of the score distribution.
    (b) To be at the 71st percentile of the distribution, a student needed a score of about _____ points on the Math SAT.

14. The heights of a group of men averaged 69 inches and followed the normal curve. The 60th percentile height was 69.625 inches.
    (a) Find the 40th percentile height.
    (b) Find the SD.

15. The formula to convert temperatures from Fahrenheit to Celsius is:

$$\mathrm{C}^\circ = \frac{5}{9}\left(\mathrm{F}^\circ - 32^\circ\right)$$

    The average daily high temperature in Seattle, Washington, in July is 77 degrees Fahrenheit, with an SD of 4.14 degrees Fahrenheit.
    (a) Translate the average daily high temperature and its SD into degrees Celsius.
    (b) One day's reading was 4.14 SDs above average on the Fahrenheit scale. Convert this temperature to standard units on the Celsius scale.