

12.4 – The Normal Distribution

Types of Distributions

Properties of a Normal Distribution

- The graph of a normal distribution is called the normal curve.
- The normal curve is bell shaped and symmetric about the mean.
- In a normal distribution, the mean, median, and mode all have the same value and all occur at the center of the distribution.
- The shape of the normal curve depends on the mean and standard deviation. (p. 708: Figure 12.10)

68-95-99.7 Rule

- Approximately 68% of all the data lie within one standard deviation of the mean (in both directions).
- Approximately 95% of all the data lie within two standard deviations of the mean (in both directions).
- Approximately 99.7% of all the data lie within three standard deviations of the mean (in both directions).

Example

Assume that the waiting times for customers at a popular restaurant before being seated for lunch are normally distributed with a mean of 12 minutes and a standard deviation of 3 min.

- a) Find the percent of customers who wait for at least 12 minutes before being seated.
- b) Find the percent of customers who wait between 9 and 15 minutes before being seated.
- c) Find the percent of customers who wait at least 18 minutes before being seated.
- d) The shortest 2.5% wait less than how many minutes.

z-Scores

- z-scores determine how far, in terms of standard deviations, a given score is from the mean of the distribution.

$$z = \frac{x - \mu}{\sigma}$$

Example: z-scores

- A normal distribution has a mean of 50 and a standard deviation of 5. Find z-scores for the following values.
■ a) 55 b) 60 c) 43