

Statistical Reasoning
HW #3 Normal Distribution

Name: _____ Date: _____ Class: _____

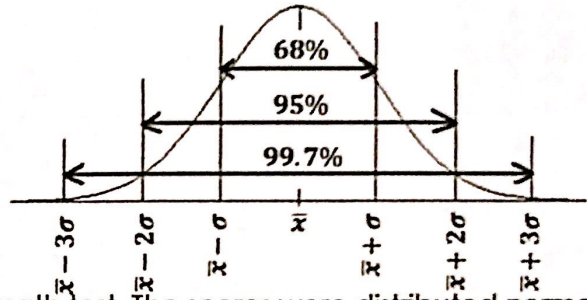
The Empirical Rule: Word problems

Definition: A probability distribution modeled by a bell-shaped curve (also called a normal curve) that is symmetric about the mean.

σ = standard deviation of the data set
 μ = mean of the data set

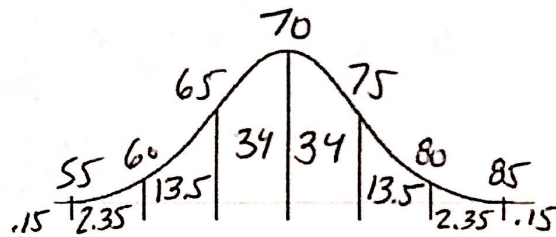
Properties of the Bell Curve

- 68% of the data lies within 1 standard deviation of the mean
- 95% of the data lies within 2 standard deviations of the mean
- 99.7% of the data lies within 3 standard deviations of the mean



Example: At State University, 2000 freshmen took a math test. The scores were distributed normally with a mean of 70 and a standard deviation of 5. Label the mean and three standard deviations from the mean.

- (a) What percentage of scores are between scores 65 and 75? $34 + 34 = 68\%$
- (b) What percentage of scores are between scores 60 and 70? $34 + 13.5 = 47.5\%$
- (c) What percentage of scores are between scores 60 and 85? $13.5 + 34 + 34 + 13.5 + 2.35 = 97.35\%$
- (d) What percentage of scores is less than a score of 55? 0.15%

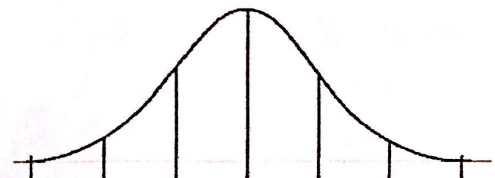


- (e) What percentage of scores is greater than a score of 80? $2.35 + 0.15 = 2.5\%$
- (f) Approximately how many biology students scored between 60 and 70? $47.5\% \times 2000 = .475 \times 2000 = 950$

You try...

1. At Central High School, 500 juniors took the ACT last year. The scores were distributed normally with a mean of 24 and a standard deviation of 4. Label the mean and three standard deviations from the mean.

- (a) What percentage of scores are between scores 20 and 28?
- (b) What percentage of scores are between scores 16 and 32?
- (c) What percentage of scores are between scores 16 and 28?
- (d) What percentage of scores is less than a score of 12?



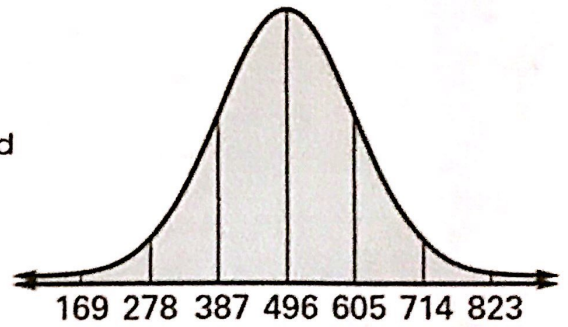
- (e) What percentage of scores is greater than a score of 24?

(f) Approximately how many juniors scored between 24 and 28?

2. The math scores for an exam for the state of Georgia are normally distributed with a mean of 496 and a standard deviation of 109.

(a) About what percent of the test-takers received scores between 387 and 605?

(b) What percent of test-takers received scores between 496 and 714?

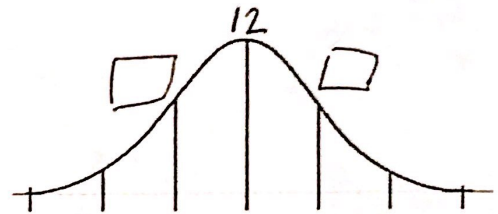


3. The data set below gives the distances, in miles, that the employees in a small office travel to work each day. Determine the range, in miles, in which 68% of the employees travel to work each day.

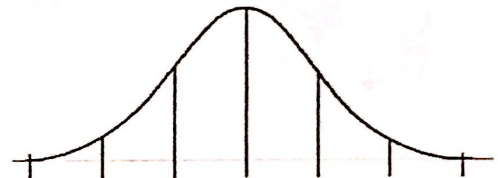
Hint: Complete the bell curve to help answer this question.

$$\text{Mean} = 12 \quad \sigma = 2.44$$

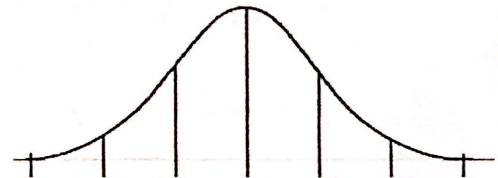
12, 15, 11, 8, 11, 13, 10, 16



4. A data set is bell-shaped with a mean of 319. If 95% of the data lies between 205 and 433, what is the standard deviation?



5. A data set is normally distributed with a mean of 127 and a standard deviation of 81. What percentage of data should lie between 127 and 370?

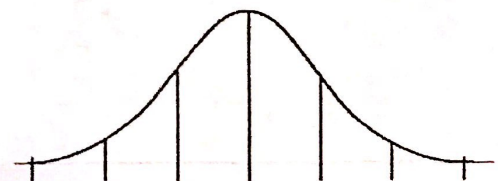


6. The mean life of a tire is 30,000 km. The standard deviation is 2000 km.

(a) 68% of all tires will have a life between _____ km and _____ km.

(b) 95% of all tires will have a life between _____ km and _____ km.

(c) What percent of the tires will have a life that exceeds 26,000 km?



(d) If a company purchased 2000 tires, how many tires would you expect to last more than 28,000 km?