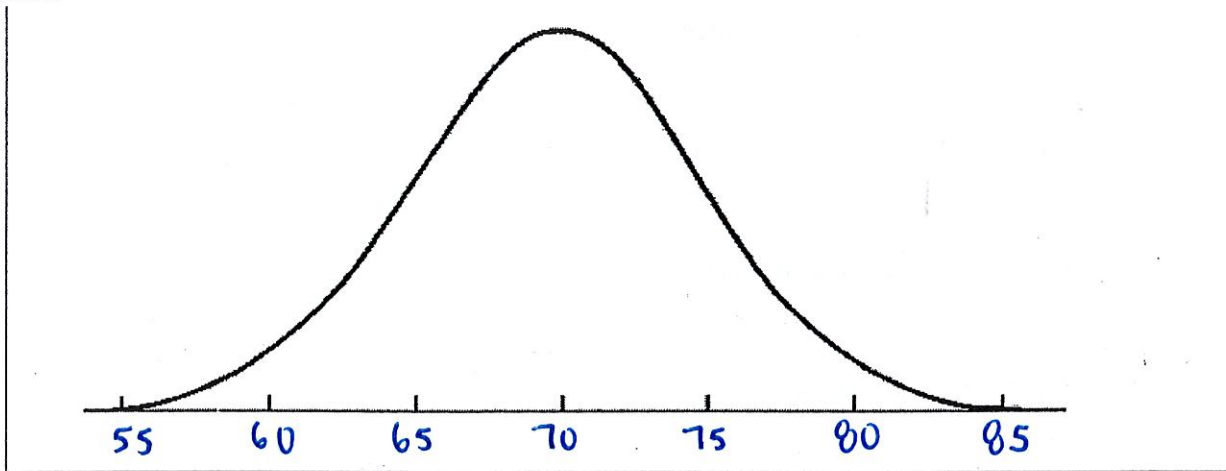


- Empirical Rule and Normal Distribution

Name _____
Date _____ Period _____

In a normal distribution, what percent of the values lie:

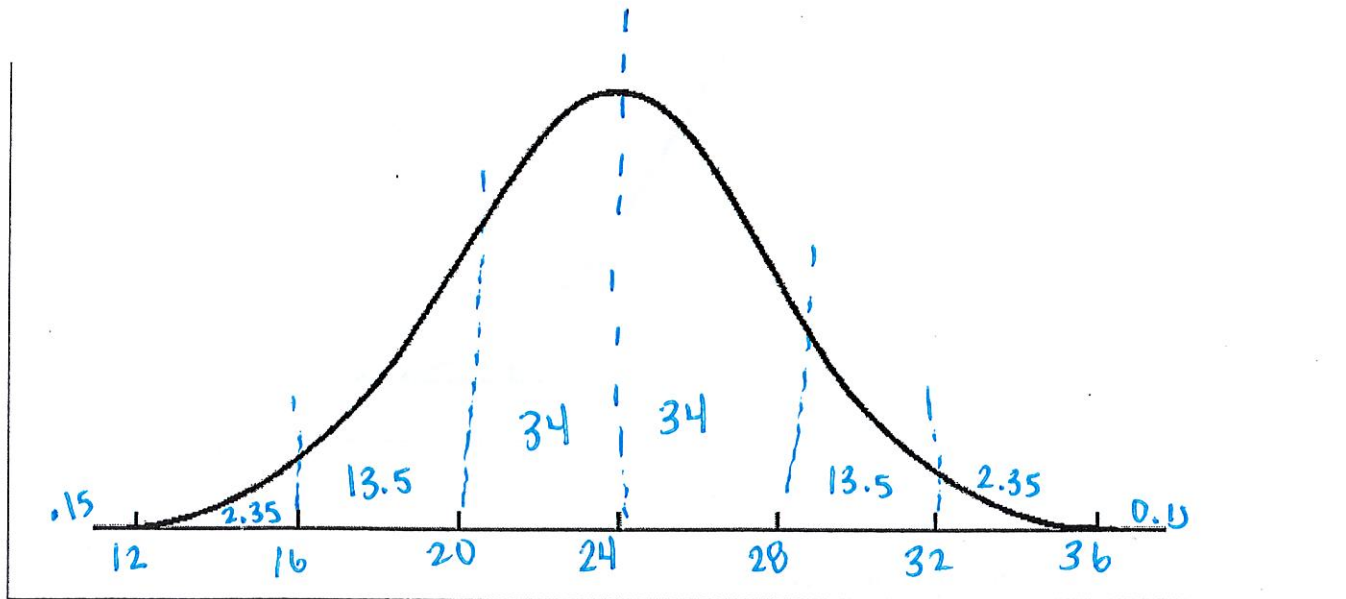
1. below the mean? 50%
2. above the mean? 50%
3. within one standard deviation of the mean? 68%
4. within two standard deviations of the mean? 95%
5. within three standard deviations of the mean? 99.7%
6. 2000 freshmen at State University took a biology test. The scores were distributed normally with a mean of 70 and a standard deviation of 5. Label the mean and three standard deviations from the mean.



Answer the following questions based on the data:

- a) What percentage of scores are between scores 65 and 75?
68%
- b) What percentage of scores are between scores 60 and 70?
47.5%
- c) What percentage of scores are between scores 60 and 85?
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?
2.5%
- f) Approximately how many biology students scored between 60 and 70?
47.5% of 2000 \approx 950 students
- g) Approximately how many biology students scored between 55 and 60?
2.35% of 2000 \approx 47 students

7. 500 juniors at Central High School 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.



Answer the following questions based on the data:

- a) What percentage of scores are between scores 20 and 28?

68%

- b) What percentage of scores are between scores 16 and 32?

95%

- c) What percentage of scores are between scores 16 and 28?

81.5%

- d) What percentage of scores is less than a score of 12?

0.15%

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

50%

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

$$0.34 \cdot 500 = 170$$

- g) Approximately how many juniors scored between 20 and 28?

$$0.68 \cdot 500 = 340$$

- h) Approximately how many juniors scored between 24 and 32?

$$0.475 \cdot 500 = 237 \text{ or } 238$$

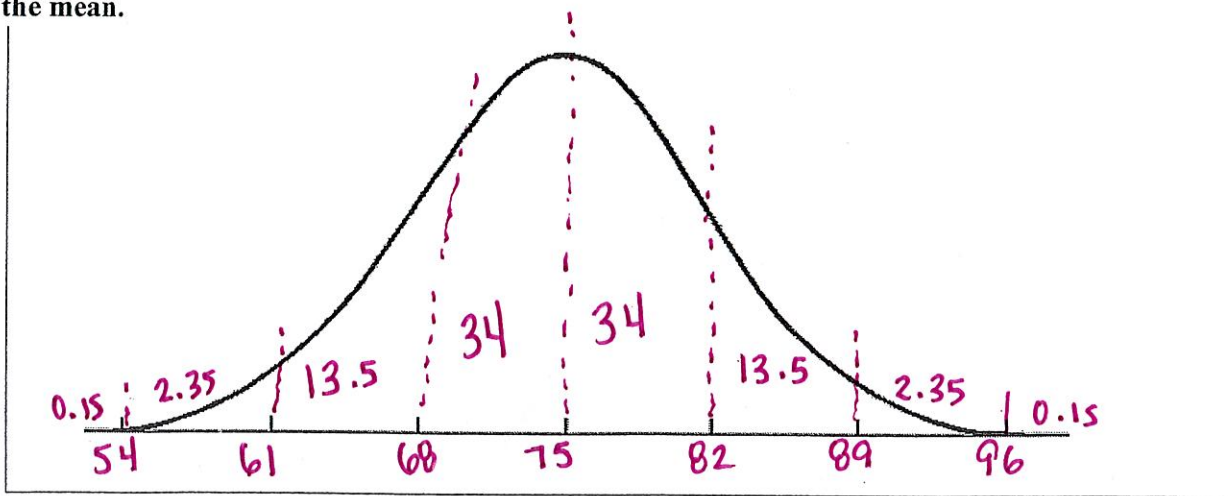
- i) Approximately how many juniors scored between 16 and 20?

$$0.135 \cdot 500 = 67 \text{ or } 68$$

- j) Approximately how many juniors scored higher than 32?

$$0.025 \cdot 500 = 12 \text{ or } 13$$

8. 500 freshmen at Schaumburg High School took an algebra test. The scores were distributed normally with a mean of 75 and a standard deviation of 7. Label the mean and three standard deviations from the mean.



Answer the following questions based on the data:

- a) What percentage of scores are between scores 61 and 82?
81.5%
- b) What percentage of scores are between scores 75 and 82?
34%
- c) What percentage of scores are between scores 61 and 89?
95%
- d) What percentage of scores is less than a score of 61?
2.5%
- e) What percentage of scores is greater than a score of 96?
0.15%
- f) Approximately how many algebra students scored between 61 and 89?
 $0.95(500) = 475$
- g) Approximately how many algebra students scored between 68 and 82?
 $0.68(500) = 340$
- h) Approximately how many algebra students scored between 61 and 75?
 $0.475(500) \approx 238$
- i) Approximately how many algebra students scored between 89 and 96?
 $0.0235(500) \approx 12$
- j) Approximately how many algebra students scored higher than 89?
 $0.025(500) \approx 13$

9. Here are the scores for a recent test in M414 Statistics.

90 90 95 100 80 80 75 80 70 60 95 100 100
 100 75 80 90 90 90 70 70 80 85 90 90 85

Answer the following questions regarding this set of data.

Median = 87.5 Mean = 85 Mode = 90

Standard Deviation = 10.4 Variance = 116.64

How many scores are within 1 standard deviation of the mean? 18

$$0.68(26) \approx 18$$

How many scores are within 2 standard deviations of the mean? 25

$$0.95(26) \approx 25$$

Hint: Drawing the curve will help answer the last two questions!!!

