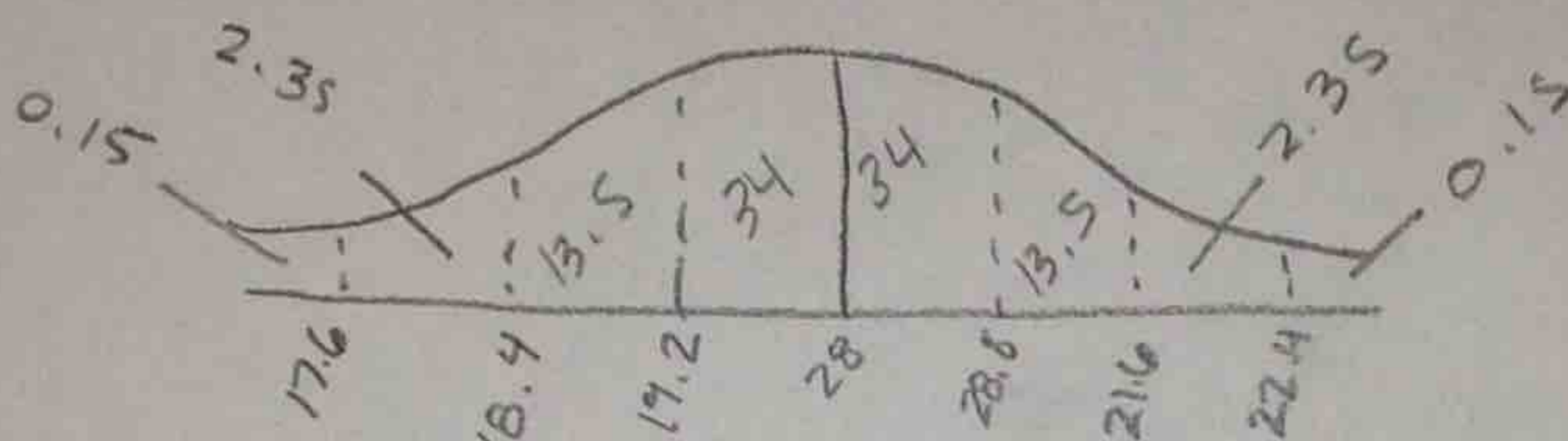


Homework 9.4: Normal Calculations

Name: _____

Math 3

- A Bakery makes loaves of rye bread that have an average weight of 28 ounces and a standard deviation of 0.8 ounce. The distribution of weights is normal.
 - Draw a normal curve with the horizontal axis labeled



- About 95 percent of the loaves will have weights that lie within what interval?

$$18.4 - 21.6$$

- What percent of the loaves will weigh more than 28.8 ounces?

$$16\%$$

- What will the top 16% weigh above?

$$28.8 \text{ oz}$$

- What is the weight of the 84th percentile (at or below 84%)?

$$\text{INV NORM}(.84, 28, 0.8) = 28.8 \text{ oz}$$

- The Chapin Social Insight Test evaluates how accurately the subject appraises other people. The scores are approximately normally distributed with a mean of 25 and a standard deviation of 5.
 - If a randomly selected student has a score of 40, then how many standard deviations away from the mean is that student's score.

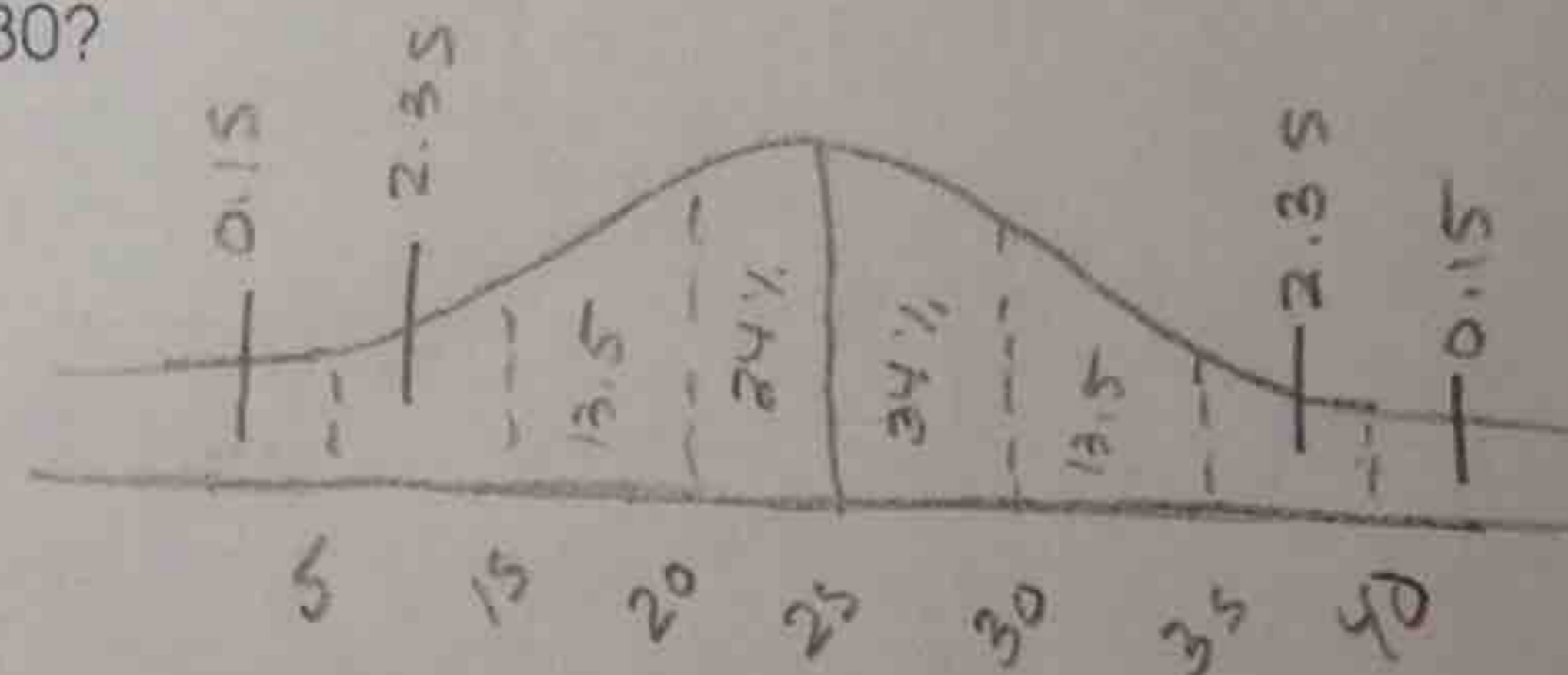
$$z = \frac{40 - 25}{5} = 3$$

- Determine the standardized value (z-score) of the score 30?

$$z = 1$$

- What percent score over a 30?

$$16\%$$



- What percent score between a 20 and 30?

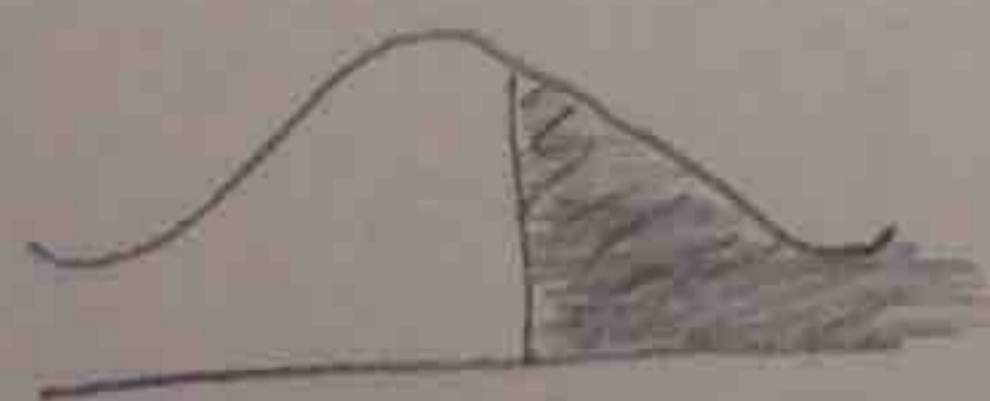
$$68\%$$

- Find the proportions of observations from a standard normal distribution that satisfies each of these statements. In all cases, sketch a standard normal curve and shade the area under the curve

a. $Z > 1.78$

b. $Z < 2.34$

c. $-1.48 < Z < 0.79$



$$\text{Normalcdf}(1.78, 999)$$

$$\text{Normalcdf}(-999, 2.34)$$

$$\text{Normalcdf}(-1.48, 0.79)$$

$$= 3.75\%$$

$$= 99.04\%$$

$$71.58\%$$

4. A pharmaceutical company manufactures capsules that contain an average of 507 grams of vitamin C. The standard deviation is 3 grams. The distribution of vitamin C is considered to be normal amongst the capsules.

a. What percent of the capsules will have above 512 grams?

$$z = 1.67 \quad 4.78\%$$

b. What percent of the capsules will have less than 500 grams?

$$z = -2.3 \quad 0.98\%$$

c. What percent will have more than 600 grams?

$$z = 31 \quad 0\%$$

d. What percent will have between 505 and 515 grams?

$$z_{505} = -0.67 \quad z_{515} = 2.67 \quad 74.5\%$$

e. At least 96 percent of the capsules will contain what amount of vitamin C?

$$\text{INV NORM}(0.96, 507, 3) = 512.3 \text{ grams}$$

5. The GRE is an examination used to predict performance in graduate school. The range of scores is 200 to 900 with a mean of 544 and standard deviation of 103. The scores are assumed to have a normal distribution.

a. What percent of students scores above 500?

$$z = -0.43 \quad 66.64\%$$

b. What percent of students score below 700?

$$z = 1.51 \quad 93.45\%$$

c. What percent of students score between 500 and 700?

$$60.1\%$$

d. How high of a score does a student need to be in the top 10%? = Bottom 90%

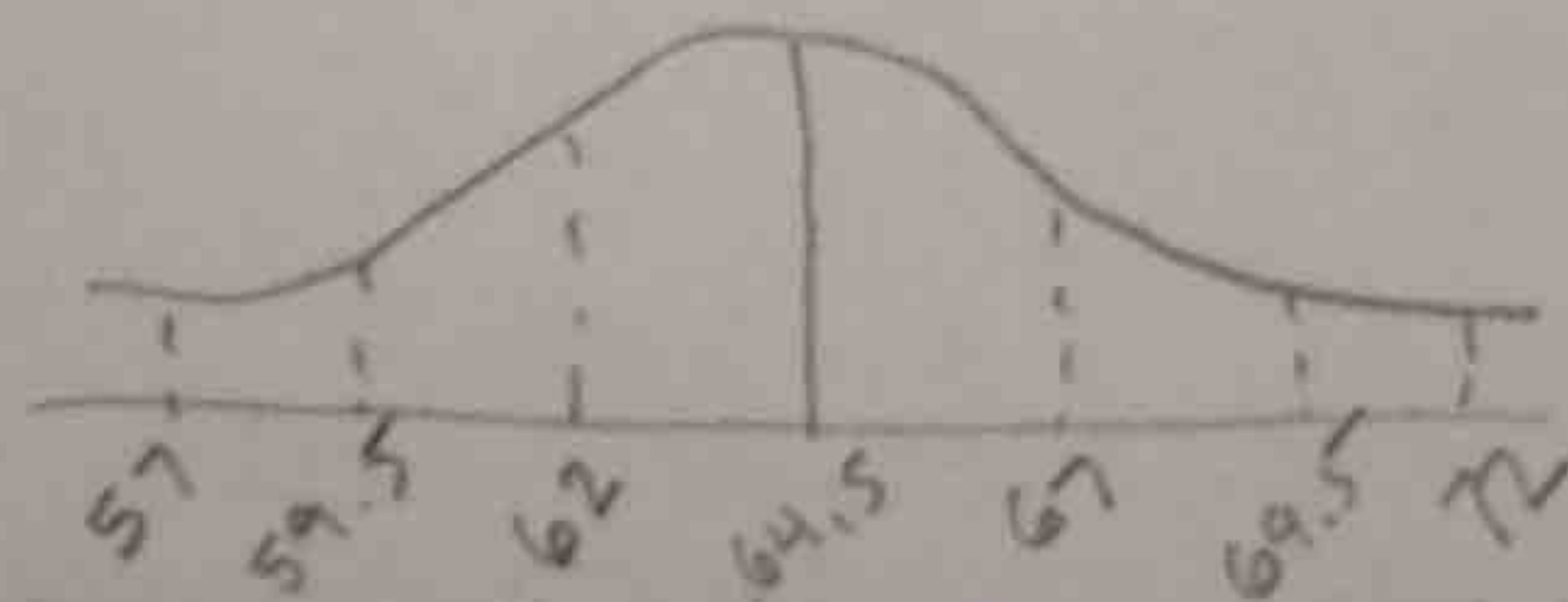
$$\text{INV NORM}(0.9, 544, 103) = 676$$

e. What minimum score would a student need in order to score better than 77% of those taking the test?

$$\text{INV NORM}(0.77, 544, 103) = 620$$

6. Women's heights are normally distributed with a mean of 64.5 and a standard deviation 2.5

a. Draw a normal curve



b. What % are over 65 inches?

$$z = 0.2 \quad 42.07\%$$

c. What % are under 5 feet?

$$5 \text{ ft} = 60 \text{ in} \quad z = -1.8 \quad 3.59\%$$

d. What % are over 6 feet?

$$6 \text{ ft} = 72 \text{ in} \quad 0.15\%$$

e. How tall are the top 10%?

$$\text{INV NORM}(0.9, 64.5, 2.5) = 67.7 \text{ in}$$