Chapter 5 Review #2 **Prob/Stats** Name Key

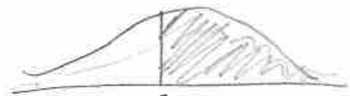
Find the indicated area under the standard normal curve. (Make a sketch as well.)

5.1

1. To the left of $z = 0.33$

$\boxed{.6293}$

2. To the right of $z = -0.57$



$1 - .2843$

$\boxed{.7157}$

3. Between $z = -1.55$ and $z = 1.04$

$.8508 - .0606 = \boxed{.7902}$

4. To the left of $z = 0.64$ and right of $z = 3.42$

$.9997 - .7389 = .2608$

$1 - .2608 = \boxed{.7392}$

The scores for the reading portion of the ACT test are normally distributed. In a recent year, the mean test score was 21.3 and the standard deviation was 6.5. The test scores of three students selected at random are 17, 23, and 8. Use this information for problems 5 and 6. $\mu = 21.3$ $\sigma = 6.5$

5. Find the z-score that corresponds to each value.

$z = \frac{17-21.3}{6.5} = \boxed{-.66}$ $z = \frac{23-21.3}{6.5} = \boxed{.26}$ $z = \frac{8-21.3}{6.5} = \boxed{-2.05}$

6. Determine whether any of the values are unusual.

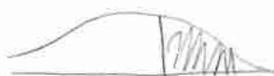
The 8 is unusual because it is more than 2 s.d. below the mean.

Find the indicated probability using the standard normal distribution. (Make a sketch as well.)

7. $P(z < 1.28)$

$\boxed{.8997}$

8. $P(0.42 < z < 3.15)$



$.9992 - .6628$

$\boxed{.3364}$

9. $P(x > -0.74)$

$1 - .2296$

$= \boxed{.7704}$

5.2

Assume the random variable x is normally distributed with mean $\mu = 86$ and standard deviation $\sigma = 5$. Find the indicated probability. (Make a sketch as well.)

10. $P(x < 80)$ $= P(z < -1.2)$

$z = \frac{80-86}{5} = -1.2$ $= \boxed{.1151}$

11. $P(x > 92)$ $= P(z > 1.2)$

$z = \frac{92-86}{5} = 1.2$

$1 - .8849$

$\boxed{.1151}$

12. $P(70 < x < 80)$

$z = \frac{70-86}{5} = -3.2$

$.1151 - .0007$

$\boxed{.1144}$

5.2

13. The weights of adult male rhesus monkeys are normally distributed, with a mean of 15 pounds and a standard deviation of 3 pounds. A rhesus monkey is randomly selected. (Don't forget sketches.)

$\mu = 15 \quad \sigma = 3$

a. Find the probability that the monkey's weight is less than 13 pounds.

$P(x<13) = P(z<-.67) = \boxed{0.2514}$

$z = \frac{13-15}{3} = -.67$

b. Find the probability that the monkey's weight is between 13 and 17 pounds.

$P(13<x<17) = P(-.67<z<.67) = \boxed{.4972}$

$z = \frac{17-15}{3} = .67$ $\qquad$ $.7486 - .2514$

c. Find the probability that the monkey's weight is more than 17 pounds.

$P(x>17) = P(z>.67) = 1 - .7486 = \boxed{.2514}$

5.3 *Use the standard normal table to find the z-score that corresponds to the given cumulative area or percentile. If the area is not in the table, use the entry closest to the area. If the area is halfway between two entries, use the z-score halfway between the corresponding z-scores.*

14. 0.0202

$\boxed{z = -2.05}$

15. 0.6443

$\boxed{z = 0.37}$

16. P_{96}

.9600

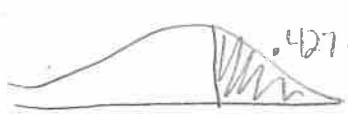
$\boxed{z = 1.75}$

17. P_{10}

.1000

$\boxed{z = -1.28}$

18. Find the z-score that has 42.7% of the distribution's area to its right.



.4270 $\qquad$ $1 - .4270$

$.5730$

$\boxed{z = 0.18}$

19. Find the two z-scores for which 88.6% of the distribution's area lies between $-z$ and z.

.886

$\frac{1 - .886}{2} = .0570$

$\boxed{z = -1.58,\ 1.58}$

5.3

20. In a survey of women in the United States (ages 20-29), the mean height was 64 inches with a standard deviation of 2.75 inches. (~~Don't forget sketches~~.) $\mu = 64$ $\sigma = 2.75$

a. What height represents the 95th percentile?

.9500

$z = 1.645$

$1.645 = \frac{x-64}{2.75}$

$4.52375 = x - 64$

$\boxed{x \approx 68.52''}$

b. What height represents the first quartile?

.2500

$z = -.67$

$-.67 = \frac{x-64}{2.75}$

$-1.675 = x - 64$

$\boxed{x \approx 62.33''}$

c. What height corresponds to $z = -1.45$?

$-1.45 = \frac{x-64}{2.75}$

$-3.9875 = x - 64$

$\boxed{x \approx 60.01''}$

21. Heights of American men aged 20 to 29 follow a normal distribution with mean 70 inches and standard deviation 3 inches. Similarly, heights of women in the same age group follow a normal distribution with mean 65 inches and standard deviation 3 inches. (Don't forget sketches.)

5.3

a. How tall must a man be to be among the tallest 15%?

$1 - .1500 = .8500$

$z = 1.04$

$1.04 = \frac{x-70}{3}$

$3.12 = x - 70$

$\boxed{x = 73.12''}$ or taller

5.2

b. Determine the probability that an American man age in this age group will be shorter than 5'6" tall. $= 66''$

$P(x < 66) = P(z < -1.33) = \boxed{.0918}$

$z = \frac{66-70}{3} = -1.33$

5.2

c. Determine the probability that an American woman in this age group will be shorter than 5'6" tall.

$P(x < 66) = P(z < .33) = \boxed{.6293}$

$z = \frac{66-65}{3} = .33$

5.4

The population mean and standard deviation are given. Find the mean and standard deviation of the sampling distribution of sample means with sample size n.

22. $\mu = 32$, $\sigma = 2.2$, $n = 50$

$\mu_{\bar{x}} = \boxed{32}$

$\sigma_{\bar{x}} = \frac{2.2}{\sqrt{50}} = \boxed{.31}$

23. $\mu = 450$, $\sigma = 85$, $n = 100$

$\mu_{\bar{x}} = \boxed{450}$

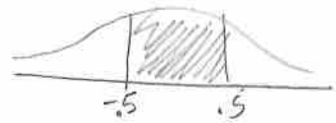
$\sigma_{\bar{x}} = \frac{80}{\sqrt{100}} = \boxed{.8}$

5.4 24. Consider the population of American households with children under age 10, and the variable "amount spent on breakfast cereal per year". Suppose that this population has a mean of \$300 with a standard deviation of \$50. $\mu = 300 \quad \sigma = 50$

a. What is the probability of a randomly selected household spending between \$275 and \$325 on cereal for a year? 5.2

$P(275 < x < 325) = P(-.5 < z < .5) = .6915 - .3085 = \boxed{.383}$

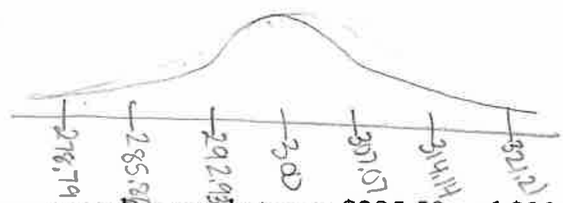
$z = \frac{275-300}{50} = -.5 \qquad z = \frac{325-300}{50} = .5$



b. If a random sample of 50 households are selected, what would the CLT tell you about the mean and standard deviation of the sampling distribution of sample means? (Draw a sketch to represent these results.) $n = 50$

$\mu_{\bar{x}} = 300$

$\sigma_{\bar{x}} = \frac{50}{\sqrt{50}} = 7.07$



c. What is the probability of getting a sample mean between \$285.50 and \$305.25 with a sample of 50 households? (make a sketch)

$P(285.50 < \bar{X} < 305.25) = P(-2.05 < z < .74)$

$= .7704 - .0202 = \boxed{.7502}$

$z_{\bar{x}} = \frac{285.50 - 300}{\frac{50}{\sqrt{50}}} = -2.05$

$z_{\bar{x}} = \frac{305.25 - 300}{\frac{50}{\sqrt{50}}} = .74$