

# Math 153 - Quiz 8

April 17, 2014

Name key Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) Weights of 15-year-old American males are normally distributed with mean 142 lb and standard deviation 12.3 lb.

(a) What is the probability that a randomly selected 15-year-old American male weighs more than 150 lb?

$$\begin{aligned}\mu &= 142 \\ \sigma &= 12.3 \\ P(x > 150) &= \text{normalcdf}(150, 99999, 142, 12.3) \\ &\approx \boxed{0.2577}\end{aligned}$$

(b) A sample of thirty-six 15-year-old American males is selected. What is the probability that the mean weight of the group is greater than 150 lb?

$$\begin{aligned}\mu_{\bar{x}} &= 142 \\ \sigma_{\bar{x}} &= \frac{12.3}{\sqrt{36}} = 2.05 \\ P(x > 150) &= \text{normalcdf}(150, 99999, 142, 2.05) \\ &\approx \boxed{0.00004763}\end{aligned}$$

2. (3 points) The average person uses 123 gallons of water daily. The standard deviation is 21 gallons.

(a) In a sample of 35 people, what is the probability that their mean water usage is less than 120 gallons daily?

$$\begin{aligned}\mu_{\bar{x}} &= 123 \\ \sigma_{\bar{x}} &= \frac{21}{\sqrt{35}} \\ P(x < 120) &= \text{normalcdf}(-99999, 120, 123, 21/\sqrt{35}) \\ &\approx \boxed{0.1990}\end{aligned}$$

(b) If the sample size was 15 instead of 35, how would your solution in part (a) change?

BECAUSE WE CANNOT ASSUME THE SAMPLING DISTRIBUTION IS NORMAL AND  $N < 30$ , THE CENTRAL LIMIT THEOREM TECHNICALLY DOES NOT APPLY. WE CANNOT DO THIS PROBLEM THE WAY PART (a) WAS DONE.

3. (2 points) The cholesterol content of eggs is normally distributed with mean 215 mg and standard deviation 15 mg. In a sample of 50 eggs, what would be an unusually large mean cholesterol content?

$$\mu_{\bar{x}} = 215$$
$$\sigma_{\bar{x}} = \frac{15}{\sqrt{50}}$$

$$\mu_{\bar{x}} + 2\sigma_{\bar{x}} = 215 + \frac{30}{\sqrt{50}}$$
$$\approx 219.24$$

A sample mean greater than

219.24 mg would be

unusually large.

4. (2 points) The average number of pounds of meat that a person consumes each year is 218.4 pounds. The standard deviation is 25 pounds. A sample of 40 people is selected. What is the probability that the mean meat consumption of the group is less than 224 pounds?

$$\mu_{\bar{x}} = 218.4$$
$$\sigma_{\bar{x}} = \frac{25}{\sqrt{40}}$$

$$P(x < 224)$$

$$= \text{normalcdf}(-99999, 224, 218.4, \frac{25}{\sqrt{40}})$$

$$\approx \text{span style="border: 1px solid black; padding: 2px;">0.9217$$