Statistics Assignment #6

- 1. Given a normal distribution with and $\mu = 100, \sigma = 10$, if you select a sample of n=25, what is the probability that \overline{X} is
- a. less than 95?
- b. between 95 and 97.5?
- c. above 102.2?
- d. There is a 65% chance that is above what value?
- 2. Time spent using e-mail per session is normally distributed, with $\mu = 8$ minutes and $\sigma = 2$ minutes. If you select a random sample of 25 sessions,
- a. what is the probability that the sample mean is between 7.8 and 8.2 minutes?
- b. what is the probability that the sample mean is between 7.5 and 8 minutes?
- c. If you select a random sample of 100 sessions, what is the probability that the sample mean is between 7.8 and 8.2 minutes?
- d. Explain the difference in the results of (a) and (c).

3. The fill amount of bottles of a soft drink is normally distributed, with a mean of 2.0 liters and a standard deviation of 0.05 liter. If you select a random sample of 25 bottles, what is the probability that the sample mean will be

- a. between 1.99 and 2.0 liters?
- b. below 1.98 liters?
- c. greater than 2.01 liters?
- d. The probability is 99% that the sample mean amount of soft drink will be at least how much?
- e. The probability is 99% that the sample mean amount of soft drink will be between which two values (symmetrically distributed around the mean)?
- 4. A political pollster is conducting an analysis of sample results in order to make predictions on election night. Assuming a two-candidate election, if a specific candidate receives at least 55% of the vote in the sample, that candidate will be forecast as the winner of the election. If you select a random sample of 100 voters, what is the probability that a candidate will be forecast as the winner when
- a. the population percentage of her vote is 50.1%?
- b. the population percentage of her vote is 60%?
- c. the population percentage of her vote is 49% (and she will actually lose the election)?

5. According to Gallup's poll on consumer behavior, 36% of Americans say they will consider only cars manufactured by an American company when purchasing a new car. (Data extracted from The Gallup Poll, <u>www.gallup.com</u>, March 31, 2010.) If you select a random sample of 200 Americans,

- a. what is the probability that the sample will have between 30% and 40% who say they will consider only cars manufactured by an American company when purchasing a new car?
- b. the probability is 90% that the sample percentage will be contained within what symmetrical limits of the population percentage?
- c. the probability is 95% that the sample percentage will be contained within what symmetrical limits of the population percentage?
- 6. The Agency for Healthcare Research and Quality reports that medical errors are responsible for injury to 1 out of every 25 hospital patients in the United States. (Data extracted from M. Ozan-Rafferty, "Hospitals: Never Have a Never Event," The Gallup Management Journal, gmj. gallup.com, May 7, 2009.) These errors are tragic and expensive. Preventable health care–related errors cost an estimated \$29 billion each year in the United States. Suppose that you select a sample of 100 U.S. hospital patients.
- a. What is the probability that the sample percentage reporting injury due to medical errors will be between 5% and 10%?
- b. The probability is 90% that the sample percentage will be within what symmetrical limits of the population percentage?
- c. The probability is 95% that the sample percentage will be within what symmetrical limits of the population percentage?

7. A factory worker (call him "Worker 1") has a productivity that is normally distributed, producing an average of 75 units per day, with a standard deviation of 20. Another worker (call him "Worker 2") also has a normally distributed productivity, with a mean of 65 units per day and a standard deviation of 21. Suppose both workers' productivities are independent of each other. What is the probability that during one week (5 working days) worker 1 will outproduce worker 2?

8. Suppose that we have two normal populations with the means and standard deviations listed here. If random samples of size 25 are drawn from each population, what is the probability that the mean of sample 1 is greater than the mean of sample 2?

Population 1: $\mu = 40, \sigma = 6$ Population 2: $\mu = 38, \sigma = 8$