Quiz 6 Practice – Central Limit Theorem and Confidence Intervals

**For each confidence interval question, you must include all of the steps shown in class, including a sentence stating your conclusion.**

1. The elevator in a women’s gym is limited to 10 passengers. Women’s weights approximate a normal distribution with mean 154 lb and standard deviation of 33 lb.
2. If 10 different women are randomly selected, find the probability that their total weight will not exceed the maximum capacity of 1750 lb.
3. If we want a 99.99% probability that the elevator will not be overloaded whenever 10 women are randomly selected as passengers, what should be the maximum allowable weight?
4. The new Lucky Lady Casino wants to increase revenue by providing busses that can transport gamblers from other cities. Research shows that these gamblers tend to be older, they tend to play slot machines only, and they have losses with a mean of $82 and a standard deviation of $60. The buses carry 40 gamblers per trip. The bus costs $200 to operate, and the casino gives each bus passenger $50 worth of vouchers. The casino needs to recover its costs in order to make a profit. Find the probability that if a bus is filled with 40 passengers, the casino makes a profit.

1. A sample of 74 cartridges produced a mean of 19300 copies and a standard deviation of 2900 copies. Construct a 96% confidence interval for the true mean number of copies produced by the cartridges.
2. In measuring breaking points of struts for ducts, 100 struts are measured and the average breaking force is found to be 2000 kN. The population standard deviation of the struts is believed to be 223 kN. Assume you wish 95% confidence.
   1. What is the interval estimate of the mean breaking point of all beams of this type?
   2. What is the estimate if you had measured 1000 beams to get the mean value?
3. Suppose we wish to determine the mean starting salary of an ELEX graduate within $5000 with 95% confidence. How large a sample do we need? In a previous study of ELEX grads, starting salaries ranged from $60000 to $150000.
4. The water flow of the sprinkler system for a building is measured at 18 locations. The mean is found to be 0.12 with a standard deviation of 0.045 m3/s. Assuming that it is reasonable that the flow would be uniform throughout the building and that the measurements indicated a normally distributed population, what is the interval estimate (99%) for the mean flow of the sprinkler system of this site?
5. Twelve randomly-selected players were observed playing video games and the duration times of game play (in seconds) are listed below. The data suggests a normally-distributed population.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4049 | 3844 | 3859 | 4027 | 4318 | 4813 | 4657 | 4033 | 5004 | 4823 | 4334 | 4317 |

Find a 95% confidence interval for the mean duration of game play.

Answers

1. a) 97.78% b) 1927 lbs
2. 99.8% (good deal for the casino!)
3. (18607, 19993)
4. a) (1956kN, 2044kN) b) (1986kN, 2014kN)
5. 78
6. (0.08926, 0.15074)
7. (4086.14s, 4593.53s)