**MTH 150 Test 3**
**Fall 2016**

**Elementary Statistics**

***Name*** _____

*Justify all answers by showing your work or by providing a coherent explanation. Please circle your answers*

**1.** A turkey producer knows from previous experience that profits are maximized by selling turkeys when their average weight os 12 kg. Before determining whether to put all their full grown turkeys on the market this month, the producer wishes to estimate their mean weight. Prior knowledge indicates that turkey weights have a standard deviation of around 1.5 kg. The number of turkeys that mist be sampled in order to estimate their true mean weight within 0.5 kg with 95% confidence is

**a.** 35 **b.** 5 **c**. 65 **d.** 10 **e.** 150

**2.** A random sample of 4 Hereford cattle each with a frame size of three (on a one-to-seven scale), gave a sample mean of 452 kg and a sample standard deviation of 12 kg, Being 95% confident, what would be the margin of error in predicting the mean?

**a.** 16.7 **b.** 19.1 **c**. 11.8 **d.** 23.5 **e.** 15.4

**3.** A horticulturist wishes to estimate the mean growth of seedlings in a large timber plot last year. A random sample of 100 seedlings is selected and the one-year growth for each is measured. The sample results are: $\bar{x} = 5.62$ cm and $s = 2.50$ cm. The 95% confidence interval for the mean growth is

**a.** (3.12, 8.12) **b.** (4.98, 6.26) **c**. (5.13, 6.11)
**d.** (5.37, 5.87) **e.** (5.57, 5.67)

**4**. A study conducted by an airline showed that a random sample of nine of its passengers disembarking at a certain airport took an average of 24.1 minutes to claim their luggage. From a previous survey it was willing to assume that time to claim luggage was normally distributed with a variance of 18 $(\text{minutes})^2$. Being 95% confident, what would be the margin of error in predicting the mean time to claim ones luggage?

**a.** 8.32 **b.** 3.92 **c**. 2.77 **d.** 3.26 **e.** 9.78

**5.** A company started a new recreation program for its employees in the hope that a little recreation would improve an employee's performance at work. To determine whether the high cost of the program is justified, the president of the company wishes to estimate the proportion of the employees who participate in the recreational activities. In a random sample of 200 employees, 60 were found to regularly participate in the recreation program. A 95% confidence interval for the true proportion of the employees who participate in the new recreation program is

**a.** (0.231, 0.369) **b.** (0.298, 0.302) **c**. (0.267, 0.333)
**d.** (0.247, 0.353) **e.** (0.237, 0.364)

**6.** You would like to estimate the percentage of "regular users of vitamins" in a large population and you would like your estimate to be accurate within 4 percentage points, 19 out of 20 times. Approximately how large should your sample be?

**a.** 600 **b.** 2400 **c** . 400 **d.** 1000 **e.** 150

**7.** An analyst, using a random sample of $n = 500$ families, obtained a 90% confidence interval for mean monthly family income for a large population: ($600, $800). If the analyst had used a 99% confidence coefficient instead, the confidence interval would be:

**a.** Narrower and would involve a larger risk of being incorrect
**b.** Wider and would involve a smaller risk of being incorrect
**c.** Narrower and would involve a smaller risk of being incorrect
**d.** Wider and would involve a larger risk of being incorrect
**e.** Wider but it cannot be determined whether the risk of being incorrect would be larger or smaller

**8.** A veterinarian wants to estimate the mean weight of a certain breed of dogs. Assuming that the standard deviation is known to be 8 lb, find how many dogs should be weighed so that he can be 95% confident that his estimate of the average weight will not differ from the true mean weight by more than 1.5 lb. (Assume a normal distribution of weights)

**9.** A laboratory tested 36 chicken eggs and found that the mean amount of cholesterol was 230 mg with $s = 20$ mg. Find a 90% confidence interval for the true mean cholesterol content of an egg.

**10.** A machine can be adjusted so that when under control, the mean amount of sugar filled in a bag is 5 lb. To check if the machine is in control, six bags were picked at random and their weights averaged 5.1 lb. At the 95% level of confidence, what he would be the margin of error in estimating the true mean if the standard deviation of the six weights was calculated to be 0.056 lb. (Assume a normal distribution for the weight of a bag.)

**11.** If we learned that the standard deviation of the amount of sugar filled in all bags from the preceding problem is 0.15 lb, how would that effect our calculation of the margin of error? (at 95% confidence)

**12.** You have measured the systolic blood pressure of a random sample of 25 employees of a company located near you. A 95% confidence interval for the mean systolic blood pressure for the employees of this company is (122, 138). Which of the following statements is a correct interpretation of this interval?

**a.** 95% of the sample of employees has a systolic blood pressure between 122 and 138.
**b.** 95% of the population of employees has a systolic blood pressure between 122 and 138.
**c.** If the procedure were repeated many times, 95% of the resulting confidence intervals would contain the population mean systolic blood pressure.
**d.** The probability that the population mean blood pressure is between 122 and 138 is .95.
**e.** If the procedure were repeated many times, 95% of the sample means would be between 122 and 138.
**f.** None of the above. The answer is _____.

Captopril is a drug designed to lower systolic blood pressure. When subjects were tested with this drug, their systolic blood pressure readings (in mm of mercury) were measured before and after the drug was taken, with the results given in the following table. (Assume a normal distribution of readings)

| Subject | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Before | 200 | 174 | 198 | 170 | 179 | 182 | 193 | 209 | 185 | 155 | 169 | 210 |
| After | 191 | 170 | 177 | 167 | 159 | 151 | 176 | 183 | 159 | 145 | 146 | 177 |
| Difference | -9 | -4 | -21 | -3 | -20 | -31 | -17 | -26 | -26 | -10 | -23 | -33 |

mean = -18.58333333

s= 10.10362971

a: Construct a 99% confidence interval for the mean difference between the before and after readings.

b: Is there significant evidence to support the claim that captopril is effective in lowering systolic blood pressure?