**Due Wednesday, July 13, 2022 (11:59 pm)**

***Problem 1*:** A random sample of 100 automobile owners in the state of Alabama shows that an automobile is driven on average 23,500 miles per year with a standard deviation of 3900 miles. Assume the distribution of measurements to be approximately normal.

a) Construct a 99% confidence interval for the average number of miles an automobile is driven annually in Alabama.
    a. **(22,493.8 , 24,506.2)**
b) Construct a 99% prediction interval for the miles traveled annually by an automobile owner in Alabama.
    a. **23,500 ± 10112.31 -> (13387.69, 33612.31)**

Sample = 100±
Mean = 23,500
Deviation = 3900

23,500 ± 2.58 (3900/sq(100) -> 23,500 ± (2.58)(390) ->23,500± 1006.2 = (22,493.8 , 24,506.2)

Prediction Interval (5.9):
23,500 ± 2.58(3900)(sq(1+1/100)) -> 23,500 ± 2.58(3900)(1.005) -> 23,500 ± 10112.31 -> (13387.69, 33612.31)

***Problem 2*:** Two kinds of thread are being compared for strength. Fifty pieces of each type of thread are tested under similar conditions. Brand A has an average tensile strength of 78.3 kilograms with a standard deviation of 5.6 kilograms, while brand B has an average tensile strength of 87.2 kilograms with a standard deviation of 6.3 kilograms. Construct a 95% confidence interval for the difference of the population means. **(6.5636, 11.2364)**

X: mean 78.3, deviation 5.6
Y: mean 87.2, deviation 6.3
Z = 1.96

87.2 – 78.3 ±1.96(sq(6.3^2/50 + 5.6^2/50)) = 8.9 ± (1.96)(sq(0.7938 + 0.6272))-> 8.9 ± (1.96)(sq(1.421) -> 8.9 ± (1.96)(1.192057046) -> 8.9 ± 2.3364 = **(6.5636, 11.2364)**

***Problem 3*:** A certain geneticist is interested in the proportion of males and females in the population who have a minor blood disorder. In a random sample of 1000 males, 250 are found to be afflicted, whereas 275 of 1000 females tested appear to have the disorder. Compute a 95% confidence interval for the difference between the proportions of males and females who have the blood disorder. **(-0.063514, 0.013514)**

Z = 1.95 for 95%
X: n = 1000, 250 cases (success)
Nx = 1002, Px = (250+1)/1002 = 0.250
Y: n = 1000, 275 cases (success)

Ny = 1002, Py = (275 +1)/1002 = 0.275

0.250 – 0.275 ± (1.96)(sq((0.250(0.75)/1002) + (0.275)(0.725)/1002))) = -0.025 ± (1.96)(0.01965) = -0.025 ± 0.038514 -> **(-0.063514, 0.013514)**