**Course- Data Analysis**

***Homework: Sampling Distribution and Confidence interval***

**Total points: 20**

**Problem 1 [8pts]**

A manufacturer of small appliances employs a market research firm to estimate retail sales of its products by gathering information from a sample of retail stores. This month an SRS of 80 stores in the Midwest sales region finds that these stores sold an average of 25 of the manufacturer's hand mixers, with standard deviation 12.

1. Give a 99% C.I. for the average number of mixers sold by a store in the region. Interpret your answer.

SE = SD / sqr(srs)

Standard error = 12 / sqr(80) = 1.34

Z score of 99% = 2.57

UB= 25 + ( 2.57 \* 1.34) = 28.45

LB= 25 – ( 2.57 \* 1.34) = 21.56

We are 99 confident that the avg number of mixers sold is between 21.55 and 28.45

1. If you compute a 90% C.I., how does the margin of error change as the confidence level decreases? Explain.

SE = SD / sqr(srs)

Standard error = 12 / sqr(80) = 1.34

Z score of 90% = 1.64

UB= 25 + (1.64 \* 1.34) = 27.21

LB= 25 – (1.64 \* 1.34) = 22.79

As the confidence level decreases, the range decreases as well.

But the avg number of mixers sold is still between the range.

1. If you increase the sample size, and compute a new 99% C.I., do you expect the new margin of error to increase or decrease? Explain.

**If you increase the sample size the margin of error will decrease due to the bigger sample size. The more sample size the less error and better estimation.**

**The bigger sample size and lower margin of error**

**Problem 2 [8pts]**

An IT professional who recently graduated from college has been interviewed for a job here in Chicago that involves development and maintenance of Web applications and the design, implement and support of electronic commerce solutions. He is offered a starting salary of 63,000 dollars per year.  A recent survey reported that the average salary of a sample of 500 Internet/Intranet developers working in Chicago  is $72,000 dollars with standard deviation equal to 13,000 dollars.

1. Construct a 90% confidence interval for the average salary of Web developers in Chicago.  Interpret your answer in simple English

SE = SD / sqr(srs)

Standard error = 13,000 / sqr(500) = 581.37

Z score of 90% = 1.64

UB= 72,000 + (581.37 \* 1.64) = 72,953

LB= 72,000 – (581.37 \* 1.64) = 71,046

1. Do you conclude that the position offered to the IT professional is competitive in terms of salary? Interpret your answer in simple English

Based on the upperbound 72 and lowebound 71 is definitely lower than the avg salary.

1. Explain to someone who knows no statistics what "90% confidence level" means.

90% confidence level means ]

The 90% confidence level means that if you repeat the experiment several times, then the real mean will be within the interval 90% of the time.

**Problem 3 [4pts]**

A bank wonders whether omitting the annual credit card fee for customers who charge at least $3,000 in a year would increase the amount charged on their credit card. The bank makes an offer to an SRS of 500 existing credit card customers. It then compares how much these customers charge this year with the amount they charges last year. The mean increase is $565, and the standard deviation is $267.

Give a 95% confidence interval for the mean amount of the increase. Interpret your answer in simple English.

SE = 267/500 = 11.94

Mean 565

UB = 565 + (1.96 \* 11.94) = 588.4

LB = 565 - (1.96 \* 11.94) = 541.60

Within the 95% confidence interval, you get an upper bound of 588.4 and a lower bound of 541.60 with the mean being $565 and being within each bound. This means that if they were to increases, it would fall between each bound and there would a 95% chance that the mean will fall between each bound.