Question 1(10 pts)

Simulate the Law of Large Numbers using Minitab by **giving Minitab steps to perform the operations below**. Use the base 2250

(a) Generate 3 samples, each of size 100, from the normal distribution with mean $\mu = 18$ and variance $\sigma^2 = 1$. Obtain the mean of each sample. (2 pts.)

(b) Stack these samples into one sample. Calculate the cumulative sum and the interquartile range from all observations in all preceding samples. (3 pts.)

© Generate a sample of size 50 from χ^2 distribution with 10 degrees of freedom (store it in c1). Now compute a new variable (store in c2) which is equal to 20 more than 75% of c1. Find the mean of c2. Write the details for computing c1 and c2.(3 pts.)

Given the normally distributed random variable X with mean 100 and variance 225, find (I) the numerical value of k such that $P(X \geq k) = 0.109$ (II) $P(90 < X < 105)$.(2 pts.)

Question2: (6 pts)

As part of a general social survey we have the following partial responses of one person.

1- Sex	√	Male		Female
2- Age		Less than 30	√	30 or over
3- Marital status	√	Never Married		Have been married

4- If you have been married do you have children?

[ ] Yes [ ] no

6- Rank the following in order of importance to education system (4 most important and 1 least important)

[3] teacher [2] book [4] building [1] rules

a) In the table below list your variables and the coding system of their values. (4 pts.)

No.	Variable Label	Value Label	Value Code

b) Enter the above data into the following SPSS work-sheet. (1 pt.)

	Var01	Var02	Var03	Var04	Var05	Var06	Var07	Var08	Var09	Var10
001										
002										
003										
004										

c) What are the best graph presentations of marital status variable? (1 pt.)

Question3 (17 pts)

Using SPSS and the data on the Sex (1=Male, 2=Female), Race (1=White, 2=Minority), Stair, body, obstacle, agility, written, composite of 28 firefighters in the file "fire.sav"

1- What percentage of all firefighters were minority females? (1.5 pts.)

2- What percentage of the firefighters who are male among the white group? (1.5 pts.)

3- Test the independence between race and sex. (2 pts.)

4- Test whether the center of the (Stair Climb Time) is greater than 13. (4 pts.)

5- Test the difference between mean Body for White and Minority. (4 pts.)

6- Construct 99% confidence interval for true mean obstacle? What does it means? (2 pts.)

7- Compare between the mean of obstacle, written, and composite. Do they differ at 5% level of significant. if so show which stations differ.(2 pts.)

Question4 (7 pts)

A dietician wants to predict the amount of calories per serving of breakfast cereals from the nutritional information e.g. sugar, fat, protein etc. He took a random sample of 77 brands of breakfast cereals and found out the nutritional information for each brand. The data are available in the file "cereal.sav".

a) Find the least squares regression line of amount of calories per serving with sugar content.

Describe the model and examine the fit of regression line (2 pts)

b) Predict the calories per serving when sugar content is 16 (1 pts)

c) Now fit a regression line for amount of calories with fat content instead of sugar content, Find the least squares regression line (1 pts)

d) Compare between the two models in terms of percentage of total variation and estimate of error (MSE). Which model is better and why? (1pts)

f) Conduct a test to see whether proportions of the 7 different manufacturers of the breakfast cereals are same. 1: American Home Food Products, 2: General Mills, 3: Kelloggs, 4: Nabisco, 5: Post, 6: Quaker Oats, 7: Ralston Purina (2 pts)