Stat 401, HW Spring 2007

Minitab Assignment

Testing the Confidence Interval Formulas for μ

Print out your answers and hand it in on Tuesday, April 10.
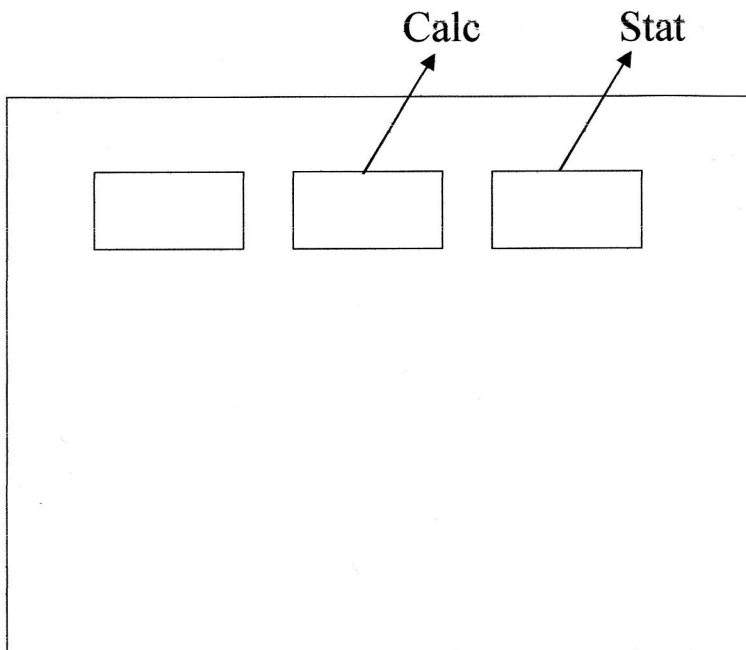
This will be worth 10 homework points. The idea is to generate 20 samples of size 100 from N(0,1), find the resulting 20 90% confidence intervals and see how many actually contain 0.

Go to the OWL Lab in 0203 in the math building.

Log on.

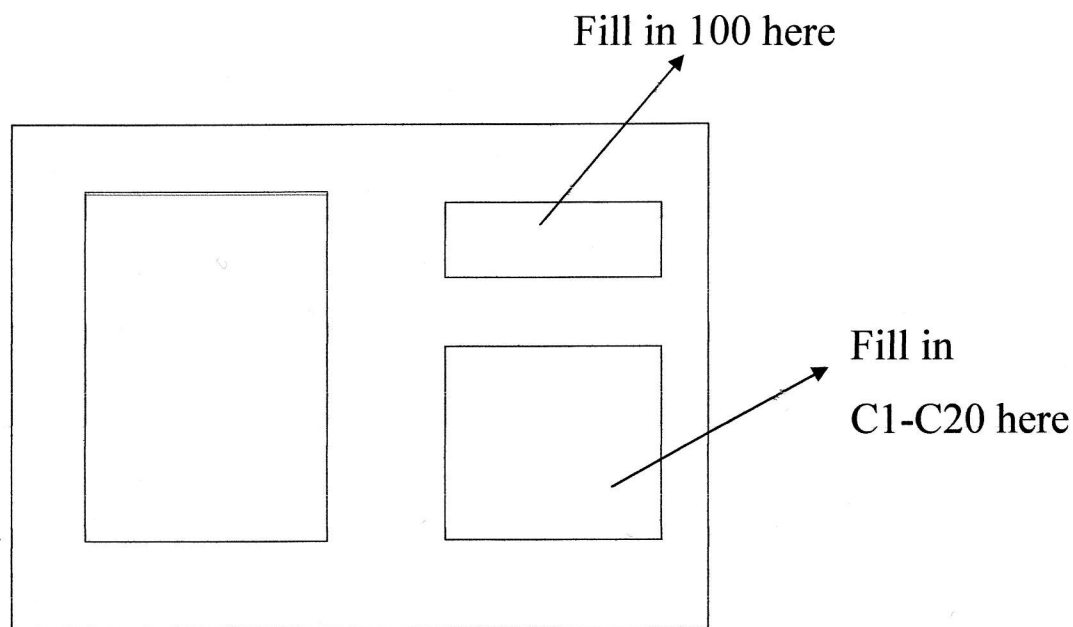Then (at the bottom of the screen), Start → Programs → Minitab

You will see

Calc   Stat

Go up to the top and click on:

Calc → Random Data → Normal

Now you will see

Fill in 100 here

Fill in
C1-C20 here

This will generate 20 columns of samples of length 100 from N(0,1)

Now we generate 20 90% confidence intervals for μ.

Go back up to the top and click on

Stat → Basic Statistics → 1 Sample Z

Click on 1-Sample Z to get:

1- Sample Z

Variables

Fill in
C1-C20

C1

C2

C3

sigma

Fill in 1
(for $\sigma = 1$)

options

Click on options to get

1 sample Z options

Confidence level

Fill in 90%

Alternative

Not equal gives
2-sided confidence
interval

Problems

1(a) How many of your confidence intervals actually contain $\mu=0$?

  (b) Does the confidence interval formula work?

2. Repeat 1(a) and (b) with 80% and 50% confidence intervals.

3. Repeat 1(a) and (b) and 2 for the t-intervals.

4. Is the <u>average</u> width of the t-intervals with <u>confidence level 90%</u> greater than the width of the z-intervals with confidence level 90% (the z-intervals all have the same width).

How to do 4

First, the z-intervals for a given confidence level all have the same width, $2(Z_{\alpha/2}\ \frac{\sigma}{\sqrt{n}})$ so you have only to compute the width of one of them in each case.

To compute the average width of the 90% t-intervals use your calculator. Enter the 20 right-hand end points in L1 and the 20 left-hand end points in L2. Now put the cursor on L3 (at the very top) and enter L3=L1-L2. This will store the 20 widths in L3.

STAT → CALC → 1-Var Stats → L3

Now you can read off the average of the numbers you have entered in L3 (so the average width of the t-intervals).