Homework Set 5 Solutions

MAT 203, Elementary Statistics, Term IV — Dowman P. Varn, Instructor
Coker College — Due: 07 April 2009

Homework Policy: The point of homework is to learn by doing. I have no problem if you work in groups, use the internet or use human resources to help you complete the assignment. I do ask that you not copy someone else's homework. Please do all the mathematics yourself. By submitting your homework, you implicitly signify that it is your own. This assignment is due at the beginning of class on 07 April 2009.

For each distribution below, find the following:

a. the number of data points;
b. the mean;
c. the standard deviation;
d. The 80% confidence interval for the actual mean;
e. The 98% confidence interval for the actual mean.

100	112	130	129	142	108	122	132	115	117
103	102	120	119	122	118	132	133	113	119
109	116	125	127	126	118	123	137	118	118
111	113	135	121	122	111	125	131	127	126

Table 1: Data Set I: A sample of numbers drawn randomly from some population. You do not know the nature of the distribution of the population.

500	512	530	529	542	548	522	532	515	517
503	532	521	529	562	519	532	553	513	529

Table 2: Data Set II: A sample of numbers drawn randomly from some population. You have reason to believe that the population is normally distributed.

Solution:

For Data Set I:

(a) We find that there are $n = 40$ data points.

(b) Using the statistical functions on the TI-83, we find $\bar{x} = 120.7$.

(c) Similarly, we find $s = 9.68$. I have used the sample standard deviation here because this is a sample from a population.

(d) Using the `Zinterval` function on the TI-83, we find (118.71, 122.64). We can also do this by working out the steps.

(1) Find $\bar{x} = 120.7$ and $n = 40$.
(2) Find $s = 9.68$.
(3) Find z_c. For a confidence level of 0.80, $z_c = 1.28$. This can be found in tables (See page A16, bottom of the page), or by `invNorm(`$\frac{c+1}{2}, 0, 1$`) = invNorm(`$\frac{0.8+1}{2}, 0, 1$`) = invNorm(0.9, 0, 1)` $= 1.28$.
(4) Next, we need to find the margin of error, E. This is $E = z_c \frac{\sigma}{\sqrt{n}}$. Substitute s for σ. So, $E = (1.28) \times \frac{9.68}{\sqrt{40}} = 1.96$.
(5) So $\mu = \bar{x} \pm E = 120.7 \pm 1.96$. This gives the 80% confidence interval to be (118.74, 122.66).

(e) Using the `Zinterval` function on the TI-83, we find (117.11, 124.24) for 98% confidence.

For Data Set II:

(a) We find that there are $n = 20$ data points.

(b) Using the statistical functions on the TI-83, we find $\bar{x} = 527$.

(c) Similarly, we find $s = 15.82$. I have used the sample standard deviation here because this is a sample from a population.

(d) Since $n < 30$ and the population is normally distributed, we need to use a t-distribution. Using the `Tinterval` function on the TI-83, we find (522.3, 531.7). We can also do this by working out the steps.

(1) Find $\bar{x} = 527$, $n = 20$ and d.f. $= n - 1 = 19$.

(2) Find $s = 15.82$.

(3) Find t_c. For a confidence level of 0.80 and d.f. $= 19$, $t_c = 1.328$. This can be found in tables (See page A18).

(4) Next, we need to find the margin of error, E. This is $E = t_c \frac{\sigma}{\sqrt{n}}$. Substitute s for σ. So, $E = (1.328) \times \frac{15.82}{\sqrt{20}} = 4.70$.

(5) So $\mu = \bar{x} \pm E = 527 \pm 4.70$. This gives the 80% confidence interval of (522.3, 531.7).

(e) Using the `Zinterval` function on the TI-83, we find (518.01, 535.99) for 98% confidence.