ASSIGNMENT – CHAPTER 7

(20 total marks)

Q 1. (2 marks)

A researcher performed blood tests on several dialysis patients on 6 consecutive visits. On variable measured the the amount of phosphate in the blood. The data on one patient in milligrams of phosphate per deciliter of blood are given below.

- 5.6 5.1 4.6 4.8 5.7 6.4
- a) Calculate the sample mean and its standard deviation.
- b) Use the *t* procedures to give a 90% confidence interval for this patient's mean phosphate level.

Answers

a)

- ◆ Mean = 5.36
- ◆ SE_x= 9.28

b)

- ◆ t _{critical} = 2.015, df = 5
- ◆ Confidence Interval = 4.819 5.914

2. (5 marks)

The table below shows pretest and posttest scores on the MLA listening test in Spanish for 20 highschool Spanish teachers who attended a summer course.

Subject	Pretest	Posttest	Subject	Pretest	Posttest
1	30	29	11	30	32

2	28	30	12	29	28
3	31	32	13	31	34
4	26	30	14	29	32
5	20	16	15	34	32
6	30	25	16	20	27
7	34	31	17	26	28
8	15	18	18	25	29
9	28	33	19	31	32
10	20	25	20	29	32

- a) We hope to show that attending the institute improves listening skills. State the appropriate H_o and H_a . Be sure to identify the parameters appearing in the hypothesis.
- b) Carry out a test. Can you reject H_o at the 5% significance level? At the 1% significance level?
- c) Give the 90% confidence interval for the mean increase in listening score due to attending the summer institute.

Answers

a) Ho: μ = 0

Ha: $\mu > 0$, where as μ is the mean improvement in score (posttest – pretest)

b)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair	Pretest Score	27.30	20	5.04	1.13
1	Posttest score	28.75	20	4.74	1.06

Paired Samples Correlations

		Ν	Correlation	Sig.
Pair	Pretest Score &	20	707	000
1	Posttest score	20	.707	.000

Paired Samples Test

		Paired Differences							
				Std Error	90% Confidence Interval of the Difference				
		Mean	Std. Deviation	Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pretest Score - Posttest score	-1.45	3.20	.72	-2.69	21	-2.024	19	.057

- Divide p = 0.057 by 2 because it is a one-tail test; p=0.0285
- Reject the Ho at 5% but not at 1% Therefore we have some evidence that scores improve
 - c) The confidence Interval at 90% is -2.69 to -.21.

3. (5 marks)

A study was conducted on the effect of drugs on pulse rate of patients during heart surgery. The subjects were divided into two groups of 30. One group received the drug, the other a placebo. The treatment group had a mean of 65.2 pulse rate and standard deviation of 7.8. The control group had a mean of 70.3 and a standard deviation of 8.3.

- a) Do the drugs reduce the pulse rate? State the hypothesis and do a t test. Is the result significant at a 5% level? At 1% level?
- b) Give a 99% confidence interval for the difference in mean pulse rates.

Answers:

a) Ho: μ₁ = μ₂

Ha: $\mu_1 > \mu_2$, where μ_1 is the beta-blocker population mean pulse rate and μ_2 is the placebo mean pulse rate

t = -2.4525, with a t(29) distribution we have 0.01<P<0.02, which is significant at 5% but not at 1%

4. (5 marks)

A selective private college gives the SSHA to an SRS of both males and females in first year. The data for women are:

154109137115152140154178101103126126137165165129200148

The scores for men were:

1081401149118011512692169146109132758811315170115187104

- a) Most studies have found that the mean SSHA score for men is lower than for women. Test this supposition. State a hypothesis, carry out a test and obtain a p-value and give your conclusions.
- b) Give a 90% confidence interval for the mean difference between the SSHA scores of males and female first year students at this college.

Answers:

a) Ho: $\mu_w = \mu_m$ Ha: $\mu_w > \mu_m$

T-Test

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
Score on SSHA	Women	18	141.06	26.44	6.23
	Men	20	121.15	32.70	7.31

Independent Samples Test

		Levene's Equality of	Test for Variances	or t-test for Equality of Means						
							Mean	Std. Error	90% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Difference	Difference	Lower	Upper
Score on SSHA	Equal variances assumed	.828	.369	2.049	36	.048	19.91	9.72	3.50	36.31
	Equal variances not assumed			2.072	35.620	.046	19.91	9.61	3.68	36.13

t = 2.049, P = 0.024 (one-tail test)

Therefore you reject the Ho at 5% but not at 1%; there is evidence that the women's mean score than the men's

c) Confidence Interval is 3.50 - 36.31

5. (3 marks)

Look at the data from the pervious question. SSHA scores are generally less variable for women than men. We want to know whether this is true for this college.

- a) State the Ho and Ha. Note that Ha is one sided in this case.
- b) Because Table E contains only upper critical values for F, a one-sided test requires that in calculating F the numerator s2 belongs to the group that Ha claims to have the larger standard deviation. Calculate this F.

Answers:

a) Ho: $\sigma_m = \sigma_w$; $\sigma_m > \sigma_w$

b) $F = (32.8519/264363)^2 = 1.544$, using F (15,17), we find that P>0.10

Therefore you reject the Ho because you do not have enough evidence to conclude that men's SSHA scores are more variable than the women's.