Name

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Student Number

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STA 220F Summer 2004 Quiz 5

1. A random sample of 25 older adults with arthritis rate their level of pain on a 100-point scale, with higher numbers indicating more pain. Then they participate in a weight lifting exercise program, emphasizing small numbers of repetitions with (relatively) heavy weight. After six weeks, they fill out the pain questionnaire again. For each subject, we calculate Change = Pre − Post, so that positive numbers represent a decrease in pain. Here is some Minitab output, giving descriptive statistics for Pre, Post and Change.

	N	MEAN	MEDIAN	TRMEAN	STDEV	SEMEAN
Pre	25	58.68	58.00	58.43	12.35	2.47
Post	25	69.44	68.00	68.96	11.29	2.26
Change	25	-10.76	-11.00	-11.17	7.82	1.56

	MIN	MAX	Q1	Q3
Pre	41.00	82.00	45.50	69.00
Post	53.00	97.00	61.00	77.50
Change	-21.00	9.00	-17.00	-7.00

The question is, did the exercise program affect average pain rating? Past experience with this scale indicates that the the distributions of Pre, Post and Change scores should all be approximately normal.

(a) State the null hypothesis

    i. (3 Points) in symbols.

ii. (3 Points) in words.

(b) State the alternative hypothesis
  i. (3 Points) in symbols.

  ii. (3 Points) in words.

(c) (3 Points) Give the rejection region for $\alpha = 0.05$.

(d) (6 Points) Give the numerical value of the test statistic. The answer is a number. Show your
   work. Round your answer to 3 decimal points.

(e) (3 Points) Do you reject H_0? Answer Yes or No.

(f) (4 Points) Give the p-value. The answer may be a range of numbers. Draw a
   picture, too.

(g) State your conclusion
  i. (6 Points) in symbols.

    ii. (6 Points) in words.

2. (20 Points) Recall the sample of 37 U.S. prisoners who committed suicide while in jail. We are pretending this is a random sample. Give a 95% confidence interval for p, the population proportion who are charged with murder or manslaughter. Don't show any work; just copy the numbers from your printout. On your printout, circle the confidence interval, and write "Question 2." Attach this page of your printout to the quiz. You cannot get any marks for this question without the printout.

3. Again, consider the data of Question 2. A criminologist claims that half the prisoners who commit suicide in jail are in for murder or manslaughter. Test this at $\alpha = 0.05$.

  (a) State the null hypothesis
    i. (3 Points) in symbols. It's about p, a number between zero and one.

    ii. (3 Points) in words.

  (b) State the alternative hypothesis
    i. (3 Points) in symbols.

    ii. (3 Points) in words.

  (c) (3 Points) Give the rejection region for $\alpha = 0.05$.

  (d) (6 Points) Give the numerical value of the test statistic. The answer is a number. Don't show any work; just copy it from the printout.

  (e) (3 Points) Do you reject H_0? Answer Yes or No.

  (f) (4 Points) Give the p-value. The answer is a number. Don't show any work; just copy it from the printout.

  (g) State your conclusion
    i. (6 Points) in symbols.

    ii. (6 Points) in words.

On your printout, circle the numerical value of the test statistic

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and p-value you gave above, and write
"Question 3." Attach this page of your printout to
the quiz. You can get at most 15 marks for this question without
the printout.