Midterm 3A–Stat 100–Spring 2001

You will need a calculator. You may use ONE page of notes (writing/xeroxing allowed both sides). Each problem is worth 20 points. Different parts of a problem have equal weight unless otherwise indicated. Put a box around the final answer to a question.

NOTE: When you are asked for a confidence interval, do NOT take the time to evaluate numbers on your calculator. Just write out the appropriate formula, with all appropriate numbers substituted.

1. A university official wishes to estimate the proportion p of students who hold part-time jobs. In each of the two cases below, determine how many students should be surveyed if the official wants to be 95% certain that the estimate does not differ from the true proportion by more than .05 .

(a) The official is confident that p is at least .85 .
(b) The official has no idea about the value of p.

2. The following summary statistics are recorded for independent samples from two populations:

	Population 1	Population 2
Sample Size	12	14
Mean	41.2	37.4
Standard Deviation	4.98	3.12

(a) (14 points) Construct a 95% confidence interval for $\mu_1 - \mu_2$.
(b) (4 points) State any assumptions needed to justify your procedure.
(c) (2 points) Is your confidence interval a conservative confidence interval?

3. A group of 88 subjects is used in an experiment to compare two treatments. From this group, 40 subjects are randomly selected to be assigned to treatment 1 and the remaining 48 subjects are assigned to treatment 2. The means and standard deviations of the responses to the treatments are

	Treatment 1	Treatment 2
Mean	16.21	27.84
Standard Deviation	2.88	4.32

Determine a 95% confidence interval for $\mu_1 - \mu_2$, where μ_1 is the mean response to Treatment 1 and μ_2 is the mean response to Treatment 2.

**********THERE ARE MORE PROBLEMS ON THE BACK SIDE**********

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4. Five years ago, a survey showed that the average height of an NBA player was 78 inches. In a random sample of 25 players of today, the mean height and standard deviation is found to be 79.5 and 3 inches, respectively. Is this strong evidence that today's mean height μ is greater than the mean height of five years ago? Test at level of signifcance $\alpha = .05$. In your response,

a. Determine the null and alternative hypotheses.
b. Define the appropriate test statistic.
c. Determine the rejection region.
d. Determine the value of the test statistic.
e. State your conclusion and estimate a P-value.

5. Answer each part TRUE or FALSE.

(a) If a hypothesis test is run at $\alpha = .05$ and the P-value is .03, then the decision must be to retain the null hypothesis.

(b) For a hypothesis test: if the probability of a type I error is $\alpha = .05$, then the probability of a type II error is .95.

(c) If a hypothesis test is run at significance level $\alpha = .05$ on many samples from a population for which the null hypothesis is true, then for about 95% of those samples the conclusion will be to reject the null hypothesis.

(d) The point of assuming equal population standard deviations, when computing a confidence interval for $\mu_1 - \mu_2$ using the pooled standard deviation estimator s_p, is to produce a smaller confidence interval.