Midterm 3B–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 random sample of 350 American families found that 213 families owned a home computer. Establish a 98% confidence interval for the proportion of American families owning a home computer.

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

	Population 1	Population 2
Sample Size	9	11
Mean	92.7	83.4
Standard deviation	5.52	2.67

(a) (14 points) Construct a 98% confidence interval for $\mu_1 - \mu_2$.
(b) (4 points) State any assumptions needed to justify your procedure.
(c) (2 points) Was your confidence interval a conservative confidence interval?

3. A study of postoperative pain relief is conducted to determine if drug A gives longer duration pain relief than Drug B. Observed hours of pain relief are recorded for 55 patients given drug A and 58 patients given drug B. The summary statistics are

	A	B
Mean	4.64	4.03
Standard Deviation	1.25	1.82

Run the appropriate hypothesis test at level of significance $\alpha = .05$. In your response,

a. Determine the null and alternative hypotheses.
b. Define the appropriate test statistic.
c. Determine the rejection region.
d. Determine the observed value of the test statistic.
e. State your conclusion, report the P-value and comment on the strength of your conclusion.

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

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4. A criminologist examined a random sample of 16 convicts serving time for armed robbery. The mean and standard deviation of their sentences were 48 and 8 months, respectively.

(a) (15 points) Determine a 95% confidence interval for the mean sentence for armed robbery.
(b) (5 points) State any assumptions made to justify your computation.

5. Answer each part TRUE or FALSE.

(a) If a hypothesis test is run at $\alpha = .01$ and the P-value is .03, then the decision must be to retain the null hypothesis.

(b) In a given population, if the standard deviation of $\overline{X}$ is 20 when $n = 25$, then the standard deviation of $\overline{X}$ will be 10 when $n = 100$.

(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 retain the null hypothesis.

(d) If conservative 95% confidence interval for the difference of two population means are constructed from many samples, then the true population mean difference should be in at least 95% of those intervals.