

Stat 3011 Second Midterm Exam (Computer Part) Nov. 15, 2001

Name _____ Student ID _____

The exam is open book, open web pages. You may use the computer, a calculator, or pencil and paper to get answers, but it is expected that you will use the computer. **Show all your work!**

- For simple computer commands, you may write the **command** you used and the **result** it gave on this test form.
- For complicated commands or plots, make a printout and **attach the printout** to the test form (we'll provide a stapler).

No credit for numbers with no indication of where they came from!

The points for the questions total to 50.

1. [15 pts.] Suppose a random variable T has Student's t distribution with 5 degrees of freedom.
 - (a) Find the probability that T is less than -5.0 .
 - (b) Find the probability that T is greater than 1.5 .
 - (c) Find the probability that T is greater than 2.0 in absolute value, that is, $\text{pr}(|T| > 2.0)$.
 - (d) Find the t such that $\text{pr}(|T| > t) = 0.10$.
2. [15 pts.] Two groups of students in physics lab repeatedly measured the measured voltage on a battery using a voltmeter. Each group had a different battery. Each group did four measurements. Their measurements are typed in the Rweb form in the on-line version of this test as the vectors \mathbf{x} and \mathbf{y} respectively.
 - (a) Find a 99% confidence interval (note: not 95%) for the difference of the true voltages of the batteries measured by the two groups.

- (b) What assumptions are needed about the probability distributions of battery measurements in order for interval to actually have its stated confidence level?
3. [20 pts.] The task in this question is to calculate real two standard error (2 s. e.) intervals for the questions done the quick and dirty way yesterday. First the data. In poll about dessert preferences, some questions and answers were

	yes	no	don't know or not sure
Generally eat dessert	71%	21%	8%
Like ice cream	77%	18%	5%
Like vanilla ice cream	68%	20%	12%

For the subgroup consisting of children under 10 years of age the answers were

	yes	no	don't know or not sure
Generally eat dessert	91%	3%	6%
Like ice cream	95%	5%	0%
Like vanilla ice cream	80%	12%	8%

The sample size for the whole poll was 1067. The number of children under 10 years of age in the poll was 67.

- (a) What is the 2 s. e. interval for the 71% eating dessert in the whole sample?
- (b) What is the 2 s. e. interval for the 91% eating dessert in the children under 10?
- (c) What is the 2 s. e. interval for the difference $77\% - 68\% = 9\%$ in preference between ice cream in general and vanilla ice cream in the whole sample?
- (d) What is the 2 s. e. interval for the difference $95\% - 80\% = 15\%$ in preference between ice cream in general and vanilla ice cream in the children under 10?