Sec. 0301 12/5/03

Stat 400 In-Class Test 3 Fall, 2003

Instructions: Do all of the following problems, worth 25 points each. You may use calculators, a notebook sheet of notes, and the normal and **t** table handed out with the test. You need not give reduced numerical answers, but all required normal and **t** percentage points must be given numerically. Justify your steps wherever you can (especially Problems 2, 4).

#1. A sample of 225 observations of the independent and identically distributed thicknesses X_i of machined plates gives sample mean $\overline{X} = 0.75$ cm, and sample variance $s^2 = .0144\ \text{cm}^2$. Based on these data, give

(a) a one sided 90% confidence interval which provides an upper bound for the common mean thickness μ ;

(b) a two-sided 92% confidence interval for μ.

#2. Suppose that among 10^6 registered Democrats in a certain state, 35% would prefer Howard Dean to all other Democratic presidential candidates. If a poll of 1000 randomly sampled registered Democrats is drawn (with or without replacement, it does not matter) from that state, then what is the approximate probability that the proportion favoring Dean among those sampled does **not** fall between 33% and 37% ?

#3. Twenty (20) measurements of students' heights in inches are given below, in sorted order:

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49.0  55.7  56.2  59.1  59.9  61.6  61.7  62.6  63.0  64.4
65.5  67.6  67.8  67.8  69.3  69.8  72.6  74.4  75.3  78.4
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(a) Plot a **scaled** relative frequency histogram for these data, with 5 class intervals of length 6 each, ranging from 48.5 to 78.5.

(b) Find the sample median and 0.667 sample quantile for these data.

#4. If you are going to observe 11 independent $\mathcal{N}(\mu, \sigma^2)$ data values $Y_1, \ldots, Y_{11}$, and if $\overline{Y}$, s^2 respectively denote the sample mean and variance based on $Y_1, \ldots, Y_{10}$, then

(a) what is the probability that $\overline{Y} - 1.38\, s/\sqrt{10} \le \mu \le \overline{Y} + 1.83\, s/\sqrt{10}$?

(b) what is the probability that $\overline{Y} - 1.38\, \sigma/\sqrt{10} \le \mu \le \overline{Y} + 1.83\, \sigma/\sqrt{10}$?

(c) Give a 2-sided interval in terms of $\overline{Y}$, s^2 which will contain the observation Y_{11} with probability .99. Find the endpoints of this interval when $\overline{Y} = 3.2$, $s^2 = 0.81$.