Math 121 **Test #2** **Spring 2005**

1. (15 pts) Consider the following height data consisting of 25 numbers arranged in order from smallest to largest.

$$
\begin{array}{cccccccccc}
65 & 66 & 67 & 68 & 68 & 68 & 69 & 69 & 69 & 69 \\
70 & 70 & 70 & 70 & 71 & 71 & 72 & 72 & 73 & 73 \\
74 & 74 & 75 & 77 & 77
\end{array}
$$

   (a) Using the TI-83 or Excel's percentile formula $r = \left(\frac{p}{100}\right)(n-1)$, find the five-number summary of the height data.

   (b) What is the interquartile range?

   (c) Draw a boxplot of the five-number summary.

   (d) Based on your boxplot, does the distribution appear to be symmetric?

   (e) Are there any outliers?

2. (10 pts) A placement test is given to a group of six students. Out of a possible 25 points, the students score the following.

$$16, 18, 18, 19, 20, 23$$

   (a) Find the average score.

   (b) Find the standard deviation of the scores.

3. (16 pts) For the standard normal density, find the following.

   (a) The area to the left of 1.56.

   (b) The area to the right of 1.56.

   (c) The area between -1.56 and 1.56.

   (d) The 75th percentile.

4. (12 pts) A population has a normal distribution with mean $\mu = 28.5$ and standard deviation $\sigma = 4.2$. Find each of the following.

   (a) The proportion of the population that is between 25 and 30.

   (b) The 75th percentile of the population.

5. (12 pts) Two competing models of the distribution of commute times, in minutes, in a certain city are

$$H_0 : \text{The distribution is } N(35, 10),$$

and

$$H_1 : \text{The distribution is } N(55, 10).$$

$(N(35, 10)$ means the normal distribution with $\mu = 35$ and $\sigma = 10$.) The researchers will observe a single commute time and they will reject the null hypotheses if it is at least 50 minutes.

(a) Find α.

(b) Find β.

(c) Find the p-value of 45.

6. (12 pts) Of the 10 points available on a challenging problem on a math contest, the distribution of scores of the 100 contestants is as follows.

Points Earned	0	1	2	3	4	5	6	7	8	9	10
Proportion	0.40	0.10	0.05	0.05	0.0	0.0	0.0	0.0	0.05	0.15	0.20

(a) (3 pts) Draw a stick graph of this distribution.

(b) (3 pts) If a contestant is selected at random, what is the probability that he scored at least 6 points?

(c) (4 pts) Find the expected score of a randomly selected contestant.

(d) (2 pts) Is the expected score a score that you would really expect a randomly selected contestant to earn? Explain.

7. (9 pts) Determine which of the following statements are true and which are false.

(a) The sample proportion $\hat{p}$ is an unbiased estimator of the population proportion p.

(b) The variability of $\hat{p}$ decreases as the sample size increases.

(c) For all sample sizes, the distribution of $\hat{p}$ is normal.

8. (14 pts) Suppose that 60% of the HSC faculty favor a proposed "technology proficiency" graduation requirement. The student government takes a survey of 24 randomly selected faculty members. Let $\hat{p}$ be the proportion of faculty members in the sample that favor the proposed requirement.

(a) (6 pts) Describe the sampling distribution of $\hat{p}$. Be sure to give all relevant characteristics.

(b) (2 pts) Is the sample size large enough to assure that the distribution of $\hat{p}$ is approximately normal? Justify your answer.

(c) (6 pts) What is the probability that the student government's survey would show less than 50% support for the proposed requirement?