Unit 5 – The Normal Distribution
Practice Problems

Due: Monday November 7, 2011

1. ***Before you begin**: This exercise gives you practice in calculating probabilities under the standard normal curve. See lecture notes for unit 5 pp 12-18. A good url to use is http://davidmlane.com/hyperstat/z_table.html*

Find the proportion of observations from a standard normal distribution that satisfies each of the following statements.

a. $Z < 2.85$

b. $Z > 2.85$

c. $Z > -1.66$

d. $-1.66 < Z < 2.85$

e. $Z < -2.25$

f. $Z > -2.25$

g. $Z > 1.77$

h. $-2.25 < Z < 1.77$

2. ***Before you begin:*** ***This exercise gives you practice in calculating probabilities under normal curves with non-zero mean and non-unit variance. The same url will work for this exercise too. It is http://davidmlane.com/hyperstat/z_table.html***

The height, X, of young American women is distributed normal with mean μ=65.5 and standard deviation σ=2.5 inches. Find the probability of each of the following events.

a. $X < 67$

b. $64 < X < 67$

3. ***Before you begin:*** ***This exercise gives you additional practice in calculating probabilities under normal curves with non-zero mean and non-unit variance.***

Suppose the distribution of GRE scores satisfies the assumptions of normality with a mean score of μ=600 and a standard deviation of σ=80.

a. What is the probability of a score less than 450 or greater than 750?
b. What proportion of students have scores between 450 and 750?
c. What score is equal to the 95th percentile?

4. ***Before you begin:*** ***Ditto***

The Chapin Social Insight Test evaluates how accurately the subject appraises other people. In the reference population used to develop the test, scores is normally distributed with mean μ=25 and standard deviation σ=5. The range of possible scores is 0 to 41.

a. What proportion of the population has scores below 20 on the Chapin test?
b. What proportion has scores below 10?
c. How high a score must you have in order to be in the top quarter of the population in social insight?

5. ***Before you begin:*** ***This exercise is purposely more thoughtful and asks you to think a bit about the meaning of the ideas in unit 5. There is not an explicit example that you can mimic. Just give it a try!***

A normal distribution has mean μ=100 and standard deviation σ=15 (for example, IQ). Give limits, symmetric about the mean, within which 95% of the population would lie:

a. Individual observations.
b. Means of 4 observations.
c. Means of 16 observations.
d. Means of 100 observations.
e. Write down an expression for the width of the limits symmetric about the mean, within which 95% of the population of means of samples of size n would lie.