

**Unit 5 – The Normal Distribution**  
**Practice Problems**

**Due: Monday November 9, 2009**

1. ***Before you begin:** This exercise gives you practice in calculating probabilities under the standard normal curve. See lecture notes for unit 5 pp 16-18. A good url to use is [http://davidmlane.com/hyperstat/z\\_table.html](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. See lecture notes for unit 5 pp 20-21. The same url will work for this exercise too. It is [http://davidmlane.com/hyperstat/z\\_table.html](http://davidmlane.com/hyperstat/z_table.html)*

The height,  $X$ , of young American women is distributed normal with mean  $\mu=65.5$  and standard deviation  $\sigma=2.5$  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  $\mu=600$  and a standard deviation of  $\sigma=80$ .

- What is the probability of a score less than 450 or greater than 750?
- What proportion of students have scores between 450 and 750?
- 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  $\mu=25$  and standard deviation  $\sigma=5$ . The range of possible scores is 0 to 41.

- What proportion of the population has scores below 20 on the Chapin test?
- What proportion has scores below 10?
- 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  $\mu=100$  and standard deviation  $\sigma=15$  (for example, IQ). Give limits, symmetric about the mean, within which 95% of the population would lie:

- Individual observations.
- Means of 4 observations.
- Means of 16 observations.
- Means of 100 observations.
- 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.