Homework Assignment 2

(Due in class on Thursday, 01/30/2014)

STA 371G, Statistics and Modeling, Spring 2014

Problem 1

Suppose $Z \sim \mathcal{N}(0, 1)$, i.e., the random variable Z follows a standard normal distribution.

(a) Find $P(Z < -1.25)$.

(b) Find $P(Z > 1.50)$.

(c) Find $P(-0.10 < Z < 1.40)$.

Problem 2

Suppose $X \sim \mathcal{N}(5, 10)$, i.e., X is normal distributed with mean 5 and variance 10. Compute:

(a) $P(X > 5)$

(b) $P(X > 5 + 2 \times \sqrt{10})$

(c) $P(X = 8)$

(d) Express $P(-2 \leq X \leq 6)$ in terms of Z, the standard normal random variable.

Problem 3

Suppose that Z follows a standard normal distribution. The probability is 10% that Z is greater than what number?

Problem 4

A company can purchase raw material from either Supplier A or Supplier B and is concerned about the amounts of impurity the material contains. A review of the records for each supplier indicates that the percentage impurity levels in consignments of the raw material follow normal distributions with the means and standard deviations given in the table below. The company is particularly anxious that the impurity level in a consignment not exceed 5% and want to purchase from the supplier more likely to meet that specification. Which supplier should be chosen?

	Mean	Standard Deviation
Supplier A	4.4	0.4
Supplier B	4.2	0.6

Problem 5

The tread life of a particular brand of tires has a normal distribution with mean 40,000 miles and standard deviation 5,000 miles. What proportion of these tires will have tread lives between 35,000 and 45,000 miles? What proportion of these tires will have tread lives between 30,000 and 50,000 miles?

Problem 6

According to the official Federal Election Commission report for the presidential election in 2012, out of a total of 7,993,851 votes in Texas, President Barack Obama received 3,308,124 votes.

(a) If you randomly survey 1000 Texas residents who had voted in the 2012 presidential election, can you predict the distribution of the number of votes for President Obama among these 1000 Texas voters? Will you be surprised to find out that more than 500 of them voted for President Obama? (Hint: using the normal approximation to the binomial distribution.)

(b) According to http://www.politico.com/2012-election/results/president/texas/, In Dallas County, TX, President Obama received 57.1% of the votes in the 2012 presidential election. If you randomly survey 100 residents of Dallas County who had voted in the 2012 presidential election, can you predict the distribution of the number of votes for President Obama among them? Will you be surprised to find out no more than 50 votes for President Obama?