**MA 222 EXAM #1 Feb. 23, 2015**

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

I pledge my honor that I have abided by the Stevens Honor System.

signature: ­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Closed book, closed notes, no electronic access. Answer all questions.

(15 points)

1. A box contains sixty 40-watt bulbs, fifty 60-watt bulbs, and forty 75-watt bulbs. If bulbs are randomly selected one by one (without replacing them after their selection), what is the probability that at least two bulbs must be selected in order to get a 75-watt bulb?

(15 points)

2. From a deck containing the usual 52 cards find the probability that a randomly dealt five-card poker hand (the same as choosing 5 cards at random without replacement) will have all 5 cards be of the same suit. (Do not compute out to a single numerical answer.)

(15 points)

3. You are lost at sea and send out three messages for help: one by cell phone, one by radio, and one by sending out a carrier pigeon with a note attached. The success (resulting in your rescue) of each type of message is independent of the success of the other types of messages, and the probabilities of success for each of the types are:

P( cell phone successful) = .3

P( radio message successsful) = .2

P(carrier pigeon successful) = .1

What is the probability that you will be rescued?

(15 points)

4. John chooses two cards without replacement from an ordinary deck of 52 cards, after which Alice chooses two cards with replacement from a different ordinary deck of 52 cards. What is the probability that they both get the same number of hearts in their two selections?

( 20 points)

5. John has 3 email accounts. 70% of all his email messages come from Account 1, 20% come from Account 2, and 10% come from Account 3. The percentage of messages in each account that are spam are 1% for Account 1, 2% for Account 2, and 3% for Account 3.

a) What percentage of ALL of John’s email messages are spam?

b) If we choose one of John’s messages at random, and it turns out to be spam, what is the probability that the message came from Account 1?

( 20 points)

6. Consider the below network of components, with the component reliabilities (component probability of working properly) written inside each component in the diagram. Compute the reliability of the network, that is: the probability that A is successfully connected to B.