Name: _____

R. D. Foley
November 6, 2001

ISyE 2027
Test 2

Calculators, notes, and books are not allowed. Please work in the bluebook and transfer your answers to the back of this sheet. Put your name on everything and hand in both the bluebook, test, and answer sheet.

1. (30 points) Suppose the demand for milk at lunch is normally distributed with mean 25 gallons and standard deviation 2 gallons. Roughly, what is the probability that demand will be between 23 and 29 gallons? What is the mean and variance of the demand in quarts (4 quarts per gallon)?

2. (30 points) Suppose $\Pr\{X = k\} = (k + 2)/9$ for $k = 0, 1, 2$. (a) What is the mean of X? (b) What is the variance of X (c) What is the $\Pr\{X = 2 \mid X \neq 2\}$.

3. (30 points) Let X be the number of aces in a 5 card hand dealt from a standard deck. Find the probability mass function of X. That is, find $\Pr\{X = k\}$ for all k.

4. (30 points) Suppose X has probability density function $f(s) = (s + 2)/8$ for $0 \leq s \leq 2$. (a) Find the mean of X. Find the smallest median of X. Find $\mathrm{E}[2/(X + 2)]$.

5. (30 points) Suppose the time until the next random inspection is exponentially distributed with parameter 4 per hour. What is the mean time until the next inspection? Suppose we wait for 5 minutes without an inspection. Now, what is the expected remaining time until the next inspection?

6. (30 points) Suppose there is an aisle 100 feet long. Workers retrieve items from along the aisle. You are supposed to analyze the system and determine a way to decrease the distance travelled. You discover that only 20% of the items are responsible for 80% of the activity. You decide to move the worker's starting point to the midpoint of the aisle. It is easiest to think of the midpoint of the aisle as the zero point, and the worker may have to visit a random location L, which can be anywhere from -50 to 50. You put the 20% of items causing most of the activity closest to the 0 zero point. Let L represent the random location to be visited. What is the probability density function of L?