Stochastic Math Models (550.252)
Homework 3 (Due Thursday, September 22, 2011)

General Directions: You must show all work and document any assumptions to receive full credit. When formulating models, make sure to define your variables and label your objective function and constraints. Solve all linear systems using Excel. All other work should be done by hand unless otherwise stated.

1. Lawrence & Pasternack 12.10
2. Lawrence & Pasternack 12.15
3. Lawrence & Pasternack 12.20
4. Lawrence & Pasternack 12.21
5. A contractor is required by a county planning department to submit one, two, three, four, or five forms (depending on the nature of the project) when applying for a permit. Let Y represent the number of forms required of the next applicant. Based upon historical data, $\Pr(Y = y) = ky^2$ for some constant k.
   (a) What is k? (Hint: Probabilities must sum to 1.)
   (b) What is the probability that at most three forms will be required?
   (c) What is the probability that between two and four forms (inclusive) will be required?
   (d) What is $E(Y)$?
   (e) What is $Var(Y)$?
6. A small company pre-orders copies of a certain magazine each week. Let D represent the demand for the magazine with probability mass function given in the table below:

d	1	2	3	4	5
$p(d)$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{2}{10}$	$\frac{1}{10}$

   (a) Find $E(D)$ and $Var(D)$.
   (b) Suppose the cost for the company to purchase the magazine is \$1.50. The company then charges its customers the suggested retail price of \$3.95 for each copy purchased. Magazines that are not bought at the end of the week must be thrown away. Customers who come after all magazines have been sold find a copy elsewhere.

   Is it better for the company to order 2 or three copies of the magazine? (Hint: For the two cases, express net revenue as a function of demand and then compute expected revenue.)