Homework 8.

1. (10 points) You have a business renting out specialized tools and equipment. For one particular kind of tool, you have observed the following historical daily demand pattern:

Demand	Probability
0	6%
1	16%
2	24%
3	21%
4	19%
5	9%
6	5%

For example, you have observed that the demand is 0 about 6% of the days, 1 for about 16% of the days, and so forth. You have never seen demand go above 6 in a single day. You are trying to decide how many units of the tool to keep on hand to rent to customers. You calculate that, including financing costs and maintenance, each unit costs you $125 per day to keep on hand. You charge your customers $239 per day to rent the tools, and the customers keep them for only one day at a time. Each time a customer requests a tool but you do not have a working one to rent, you undergo a loss of "good will" whose value you estimate at $50. What is the best number of tools to keep on hand? Try all values from 1 to 6, with a sample size of 1000.

2. (15 points) Your store stocks two perishable products, A and B. The demands for these products are well-modeled by independent Poisson random variables with average values of 72 and 61, respectively. The properties of these products are as follows:

	Product A	Product B
Cost	$ 12.50	$ 18.25
Sale Price	$ 25.00	$ 30.00
Return Credit	$ 8.00	$ 7.00
Average Demand	72	61
Chance Customer will Switch to Other Product if Unavailable	45%	55%

For example, product A costs you $12.50 per unit and sells for $25.00, and can be returned to your supplier for a credit of $8.00. Each day, you take orders for products A and B on a first-come, first-served basis. Then, if you run out of product A but not B, you take each customer whose order for A you could not fill, and offer them product B instead. Each such customer has a 45% chance, independent of all other customers, of switching to product B (in which case they pay the regular price for B). A similar situation occurs if you run out of B but not A, except the chance customers will switch is 55%. Suppose you can order each product only by bulk. Of all possible combinations of stocking 40, 60, 80, or 100 units of A, and 40, 60, 80, or 100 units of B, which yields the highest expected profit?

Due on Wednesday, November 28, in class.