Chapter 13 Problems

1. At a concert on campus, 20% of people purchase Zone A tickets, for $47 each. The other 80% of people purchase Zone B tickets, for $38 each. If five people are selected at random, what is the expected revenue from these five ticket sales?
2. Four students order noodles at a certain local restaurant. Their orders are placed independently. Each student is known to prefer Japanese pan noodles 40% of the time (it is a very popular and tasty dish!). Let $X$ be the number of students who order Japanese pan noodles. What is the variance of $X$?
3. Roll two dice; let $X$ denote the maximum of the two values that appear. Find $E[X]$.

Find $E[X^2]$.

Find $\text{Var}(X)$. 
4. Three hundred little plastic yellow ducks are dumped in a pond; one of them contains a prize tied around its foot. Leonardo examines each duck until he discovers the prize. He discards each duck without a prize after he checks it, so that he never needs to check a duck more than one time!

Find the variance of the number of ducks he checks until he discovers the prize. Please carefully justify your answer.

Hint: You might find it useful to know, as discussed in Example 13.11, that

$$1^2 + 2^2 + \cdots + n^2 = \frac{(n)(n+1)(2n+1)}{6}.$$
5. For a random variable $X$ and a function $g$ that you choose (whatever you like), compute the expected value of $g(X)$. 
6. Create your own scenario with a discrete random variable $X$. Compute the variance of $X$. 