Math 13 - Practice Test 2, Spring 2016

Name: ____ **Class Number:** _______________

1) California license plates consist of one number, followed by three letters, followed by three numbers (e.g. 5 BCC 013). How many license plates are possible if:

a. repetition of numbers and letters is allowed?
b. repetition is allowed but the first number cannot be 0, and the letter "O" is not allowed

2) Suppose that A and B are independent events with $P(A) = 0.7$, and $P(B^c) = 0.4$. Find the following probabilities:

a. $P(A^c) =$
b. $P(B) =$
c. $P(B \text{ and } A) =$
d. $P(A \text{ or } B) =$
e. $P(A^c \text{ and } B) =$
f. $P(B|A) =$

3) The following table contains the values and probabilities of the random variable X

x	2	3	4	5	6	7
P(x)	0.1	0.05	0.35	0.15	0.10	0.25

a. Find the mean of the random variable X. Write down all your steps
b. Obtain the variance of X. Write down all your steps
c. Obtain the standard deviation of X.

4) If X and Y are independent variables with E(X) = 5, Var(X) = 4, E(Y) = 12, and Var(Y) = 9, find:

a. E(3X + 4Y - 5) =
b. Var(1.5X - 0.5Y) =

5) Suppose that a batch of bolts contains 10% of defective pieces. Consider a random sample of 5 bolts are taken from the batch. Let X be a binomial random variable representing the number k of defective pieces. Complete the table by computing the probabilities:

k	$P(X = k)$
0	
1	
2	
3	
4	
5	

a. What is the expected value of number of defective bolts?

b. What is the variance of number of defective bolts?

6) The random variable W is the crew size of a randomly selected shuttle mission between April 1981 and July 2000. Its probability distribution is as follows:

W	2	3	4	5	6	7	8
P(W)	0.042	0.01	0.021	0.375	0.188	0.344	0.021

a. Find the mean of the random variable $W =$
b. Obtain the standard deviation of $W =$
c. Draw the distribution of the random variable

7) A husband's year-end bonus will be:

- \$0 with probability 0.3
- \$1000 with probability 0.6
- \$2000 with probability 0.1

His wife's bonus will be:

- \$1000 with probability 0.7
- \$2000 with probability 0.3

Let S be the sum of their bonuses, and assume that the bonus of the husband is independent from the bonus of the wife. Find $E(S)$ and $Var(S)$.

8) Let X be a binomial random variable such that $E(X) = 6$, and $Var(X) = 2.4$. Find:

a. $P(X = 5)$
b. $P(X > 2) =$
c. $P(X \leq 9) =$
d. $P(X = 12) =$