NAME:

Statistics 111 Summer Session II

Homework Two

You are allowed to discuss problems with other students, but the final answers must be your own work.

For all problems that require calculation, YOU MUST ATTACH SEPARATE PAGES, NEATLY WRITTEN, THAT SHOW YOUR WORK.

Please mark your answer in the space provided. As a general rule, each blank counts for one point unless otherwise specified. If necessary work is not shown, or if that work is substantially wrong, then you will not get credit even if the answer is correct. (The obvious purpose of this is to prevent students from mindlessly copying each other's answers.)

Report all numerical answers to at least two correct decimal places.

DUE DATE: START of class on FRIDAY, July 13, 2018.

1. (**Binomial**) Consider a repeated experiment of tossing a biased coin 25 times and let the probability of getting a head in one toss be 0.6. (You could use the Table of Binomial Probabilities to find probabilities)

   (a) What is the probability of getting at most 3 tails?

   (b) What is the probability of getting at most 5 heads?

2. (**Hypergeometric**) A sample of size three is taken at random from a box that contains 12 items, six of which are defective.

   (a) What is the probability that the sample contains at most one defective item

   (b) What is the probability that the sample contains one non-defective item

3. (**Expectation and Variance**) Let X and Y be independent random variables with the following PMFs:

k	$P(X = k)$	$P(Y = k)$
0	0.1	0.6
1	0.4	0.2
2	0.5	0.2

(a) Find the PMF of XY

(b) Find $E(X)$, $E(Y)$ and $E(XY)$

(c) Find $E(e^{X^2})$

(d) Find $V(X)$, $V(Y)$ and $V(X + Y)$

(e) Find $V(XY)$

4. (**Poisson Distribution**) Assume that a policyholder is four times more likely to file exactly two claims as to file exactly three claims. Assume also that the number X of claims of this policyholder is Poisson distributed.

   (a) What is the parameter λ of the Poisson distribution?

   (b) What is the expectation $E(X^2)$?

5. (**Continuous Distributions**) Consider a random variable X with pdf $f(x) = cx$ where $2 \leq X \leq 4$. Find the following:

   (a) c

(b) $\mathbb{E}[X]$

(c) $\mathbb{E}[X^2]$ and $\mathbb{V}[X]$

(d) $\mathbb{E}[2X - X^2]$

How hard was this homework assignment and how many hours did it take you to finish it? What would you like us to do differently in class?