Eco220 Exercise set 3.

1. The distribution of the number of crashes per four week period on the corner of Mississauga Road and Dundas is distributed as a Poisson distribution with a mean of 2. What is the variance of the number of crashes on the corner of Mississauga Road and Dundas? What is the chance there will be no crashes there in a four week period. What is the chance that, given there is at least one crash, there will only be one crash.

2. The distribution of marks in ECO220 is N(65, 100). What is the chance a randomly selected student will fail the course? What is the chance that a randomly selected student will get a mark between 75 and 85? What mark would a student have to beat if she were to be in the top 10% of the class? Given that a student is in the top 50% of the class what is the chance that her mark will be greater than 90.

3 In the coming year a firms revenue (x) has a probability density function (f(x)) of the form:

x	f(x)
$2000000	0.5
$3000000	0.3
$5000000	0.2

a) What is the expected value and variance of the firms revenue.
b) Suppose the firms profit y = 0.2 x - 56000, what is the expected value and variance of its profit.

4.a) Given Z ~ N(0,1) find i) P(Z > 1) ii)P(.5 < Z < 2)
b) Given X ~ N(10, 16) find i) P(12 < X < 18) ii) the value b such that P(X < b) = .3

5 A sample of five shirts is taken from a production line. Let B_i = 1 if the i'th shirt has a missing button let B_i = 0 otherwise.
a) Under what conditions is Bi i = 1,..,5 a Bernoulli process.
b) If the sequence in a) is a Bernoulli process and $P(B_i = 1)$ = .005 i = 1,..,5. What is the probability that none of the shirts has a missing button? What is the probability that only the 5th shirt has a missing button?

6. Aptitude test scores of applicants to a university graduate program are N(500,3600).
a) Applicants need a test score of 530 to be admitted. What proportion of applicants qualify?
b) What should the university set the cutoff score a if it wants to get applicants from the top 10%?
c) If 36 applicants are randomly selected what is the probability that their average score is greater than 520?

7. The chance that a gasoline pipe will spring a leak at a given point in its 2 meter length is distributed uniformly.
a) What is the probability it will spring a leak in any given 25 centimeter length?
b) Given it springs a leak in the first 30 centimeters what is the chance it springs a leak in the first

10 centimeters?

c) Given it dos not spring a leak in the first and last 10 centimeters what is the chance that it springs a leak in the middle 10 centimeters?

d) What length of pipe would have a chance of .2475 of springing a leak?

8. Each week 10 % of the class gets picked to answer difficult questions, the class ran for 12 weeks and each weeks selection of students each independent . Jimmy got picked 9 of the 12 class weeks. Do you think that the teacher was picking on Jimmy?

9. The number of times a machine breaks down in a month is a Poisson process with a mean of .8.

a) What is the chance it will break down once?

b) What is the chance it will break down at least once?

c) What is the chance it will break down at least twice given it breaks down at least once?

d) Given 2 such machines are independently operated what is the chance that there will be a joint total of two breakdowns on the two machines in a month.

10. The random variable X takes on 3 values 1, 2 and 3. It takes on the value 0 with probability 0.2 and its mean is 1.8. What are the probabilities of the other two values and what is its variance?