*** If you have difficulty you may try making a RESONABLE assumptions. State the assumptions and how the assumptions limit your answer. Justify your responses.**
*** Hand in al materials.**

*Start a new page for each of problems 1,2 and 3.

1. An automatic egg carton loader has a 1% probability of cracking an egg, and a customer will complain if more than one egg per dozen (12) is cracked. Assume that each egg load is a independent event. (15 marks)
   a) What is the probability distribution of cracked eggs per dozen?
   b) What is the probability that a carton of a dozen eggs results in a complaint?
   c) What are the mean and standard deviation of the number of cracked eggs in a carton of a dozen eggs?

2. The time that it takes a cell to divide is normally disturbed with an average time of one hour and a standard deviation of five minutes. (15 marks)
   a) What is the probability that the cell divides in less than 45 minutes?
   b) What is the probability that a cell takes more than 65 minutes to divide?
   c) By what time is all cells having the probability of 99% completed dividing?

3. Natural red hair consists of two genes. People with red hair have two dominates, two regressive genes or one dominant and one regressive gene. A group of 1000 people was categorized as follows: (20 marks)

	Gene 2		
Gene 1	Dominant	Regressive	Other
Dominant	5	25	30
Regressive	7	63	35
Other	20	15	800

   Let A denote the event that a person has dominant red hair gene, and let B denote the event that a person has a regressive red hair gene. If a person is slected at random from this group, compute the following:
   a) P(A)
   b) $P(A \cap B)$
   c) $P(A \cup B)$
   d) P(A | B)