編號：G283　系所：醫學資訊研究所　　科目：機率統計

本試題是否可以使用計算機：□可使用，☑不可使用　（請命題老師勾選）

1. (25%) In a small biochip factory, the defect rate for each batch of 100 chips is 10%. What is the probability for each sampling of 5 sample chips as quality control and identify at least 2 defect chips.

2. (25%) Sunday morning Professor Wang used a net to randomly catch 10 rats for experiments at the NCKU Animal Center and then mark each rat a tag. Later she put them back. Next day she used the net to randomly catch 10 rats again and found 2 rats have the tags. Assume there is no rat was added into the Center. Please estimate total number of rats in the NCKU Animal Center.

3. (25%) Suppose the duration of T(in minutes) of a cell-phone call is an exponential(1/5) random variable:

$$f_T(t) = \begin{cases} (1/5)e^{-t/5} & t \geq 0 \\ 0 & otherwise \end{cases}$$

For those calls that at least 2 minutes, (a) what is the conditional probability density function(PDF) of the call duration? (b) The conditional expected value.

4. (25%) A basket has 4 yellow balls and 1 green ball. (a) Randomly pick 1 ball and NOT put it back until found the green ball, then stop. Compute the total probability of finding green ball within the first 3 trial (i.e. 1st, 2nd, and 3rd pick). (b) Repeat (a) but pick it and then put it back. (c) If we repeat to pick 3 times and put it back to basket, what is the probability of at least found green ball once.