系所組別： 醫學資訊研究所
考試科目： 機率統計　　　　　　　　　　　　　　　　　考試日期：0307，節次：3

※ 考生請注意：本試題 ☑可 □不可 使用計算機

1. [10%] A large industrial firm uses 3 local motels to provide overnight accommodations for its clients. From past experience it is known that 20% of the clients are assigned rooms at the Ramada Inn, 50% at the Sheraton, and 30% at the Lakeview Motor Lodge. If the plumbing is faulty in 5% of the room at the Ramada Inn, in 4% of the room at the Sheraton, and 8% of the rooms at the Lakeview Motor Lodge. what is the probability that (a) a client will be assigned a room with faulty plumbing? (b) A person with a room having faulty plumbing was assigned accommodations at the Lakeview Motor Lodge?

2. [20%] Let X represent the number that occurs when a green die is tossed and Y the number that occurs when a blue die is tossed. Find (a) $E(XY)$　(b) $E(X/Y)$.

3. [10%] In a certain industrial facility accidents occur infrequently. It is known that the probability of an accident on any given day is 0.005 and accidents are independent of each other. What is the probability that in any given period of 400 days there will be an accident on one day?

4. [10%] A couple decides they will continue to have children until they have two males. Assuming that P(male) = 0.5, what is the probability that their second male is their fourth child?

5. [10%] If X_1, X_2,..., X_n are independent random variables with moment-generating functions $Mx_1(t)$, $Mx_2(t)$,..., $Mx_n(t)$, respectively, and $Y = X_1 + X_2 +...+ X_n$, then $M_Y(t) = Mx_1(t)Mx_2(t)...Mx_n(t)$.

6. [10%] Please describe the similarities and differences between T distribution and Z distribution.

7. [10%] In Figure 9.1, which is the unbiased estimator of the parameter θ ? Which is the most efficient estimator of the parameter θ?

Figure 9.1 Sampling distributions of different estimators of θ.
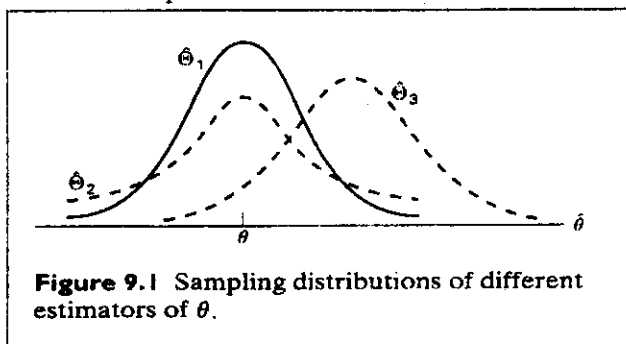
8. [10%] An electric firm manufactures light bulbs that approximately normally distributed with mean equal to 800 hours and a standard deviation of 40 hours. Find the probability that a random sample of 16 bulbs will have an average life of less than 782 hours.

This table indicates the area under the standard normal curve corresponding to $P(Z < z)$

z	.00	.01	.02	.03	.04	.05
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678

9. [10%] Some sampling data A, B, C are shown in the following two figures (a) and (b). In which figure is possibly data A, B, C sampled from the same distribution? Why?