1. 統計名詞解釋

   (a)Probabilty :

   Probability is a numerical measure of the likelihood that an event will occur.

   (b)bayes' Theorem :

   $$\mathrm{P}(A_i|B) = \frac{P(A_i)P(B|A_i)}{P(A_1)P(B|A_1) + P(A_2)P(B|A_2) + \cdots + P(A_n)P(B|A_n)}$$

   Often we begin probability analysis with initial or prior probabilities.

   Then, from a sample, special report, or a product test, we obtain some additional information.

   Given this information, we calculate revised or posterior probabilities.

   Bayes' theorem provides the means for revising the prior probabilities

   (c) random variable :

   random variable ,often denoted by X, is a function that maps outcomes to number on the real line;

   a random variable is a numerical description of the outcome of an experiment.

   (d) probability distribution :

   the probability distribution for a random variable describes how probabilities are distributed over the value of the random variable.

2. (a)

   (10%)

   determine the number of nonoverlapping classes, the width of each class and the class limits.

   (b)

   (舉例 2%,4 個定義各 4%)

   There are 3 black balls and 2 red balls in the box. If you draw 5 times and 3 times are red balls(With replacement).

   A. The experiment consists of a sequence of 5 identical trials.
   B. Two outcomes are possible on each trial.Define red ball as a success , black ball as a failure.
   C. The probability of a success, denoted by p , does not change from trial to trial. Consequently, the probability of a failure, denoted by 1 − p , does not change from trial to trial (stationarity assumption).
   D. The trials are independent.

3. (c)

   (4+4+1+1 point)

   binomial distribution:

   it's used to compute the probability that the number of experimental outcomes resulting in exactly x successes in n trials.

hypergeometric distribution:
it’s used to compute the probability that in a random selection of n elements,selected without replacement,we obtain x element labeled succeed and n-x element labeled failure.
The two probability distribution differ in two key ways. With the hypergeometric distribution, the trials are not independent; and the probability of success changes form trial to trial.
the possible outcome on each trail of these two experiment are both two
(d)
(yes/no:2 point, explanation:8 point)
If we assume that the probability of a customer arriving is the same for any two period of equal length and that the arrival or nonarrival of a customer in any time period is independent of the arrival or nonarrival in any other time period, the poisson probability function is applicable.
On the contrary, it’s inapplicable if the above assumptions are not true.

4.
(a)0.4(5%)
(b)0.6667, ParFore should display the special offer that appeals to female visitors.(3%+2%)

5.
(a)(5%)

	Yes	No	Total
23 and Under	0.1026	0.0996	0.2022
24-26	0.1482	0.1878	0.3360
27-30	0.0917	0.1328	0.2245
31-35	0.0327	0.0956	0.1283
36 and Over	0.0253	0.0837	0.1090
Total	0.4005	0.5995	1.0000

(b)0.4005(5%)

6. Lambda 錯扣 3 分/計算錯誤扣 1 分
14.4cident per hour
(a) for a 15-min period , the mean is 14.4/4 = 3.6
f(0) = exp(-3.6) = 0.0273
(b) 1-(f(0) + f(1) + f(2) + f(3))=0.4847

7. 計算錯誤扣 1 分
(a) $1-\frac{\binom{40}{10}\binom{20}{0}-\binom{40}{9}\binom{20}{1}}{\binom{60}{10}}$ =0.9163

(b) $\frac{\binom{40}{9}\binom{20}{1}}{\binom{60}{10}}=0.0725$