Department of Applied Mathematics
AMA1501 Introduction to Statistics for Business / AMA1502 Introduction to Statistics /
AMA2101 Quantitative Methods for Business
Homework 2016/2017 Semester 2
Due date: 24 March 2017 (Friday) 12:30 p.m.

1. To investigate the amount that tourists are paying for hotel rooms in a certain city, 100 tourists are randomly selected and the amount they are paying for a hotel room per night is summarized below:

Hotel room rate ($)	No. of tourists
200 – below 300	5
300 – below 500	20
500 – below 700	18
700 – below 900	35
900 – below 1100	16
1100 – below 1500	4
1500 – below 2500	2

    (a) Calculate the mean, mode and standard deviation of the hotel room rate.
    (b) Estimate, from the frequency distribution table, the maximum amount of the lowest 30% hotel room rate.
    (c) Estimate, from the frequency distribution table, the number of tourists who spend $750 to $1200 for a hotel room per night.
    (d) Ten more tourists are selected at random. Estimate, from the frequency distribution table, the probability that 5 of them are spending less than $900 for a hotel room per night.

2. (a) A travel agent is trying to reserve 10 rooms in ABC Hotel. If 11 standard rooms and 15 deluxe rooms are available, what is the probability that at least 3 deluxe rooms would be chosen? Assume that the 10 rooms are chosen at random.

    (b) According to the past records about the travelers in City H, 54% of them went to Park A and 43% of them went to Park C. In addition, 20% of them went to both Park A and Park B while 88% of them went to Park A or Park B. A group of travelers has just arrived at City H and one of them is randomly selected. Based on the given information:

    (i) Find the probability that the traveler will go to Park B.
    (ii) Knowing that the traveler will not go to Park A, find the probability that he will not go to Park B neither.
    (iii) Suppose that the probability that a traveler will not go to Park A given that he will go to Park C is 0.37. Find the probability that he will go to Park A but not Park C.

    (c) Management trainee positions of ABC Company are open for applications from graduates all over the world. From the records of last year, 28% of the applicants were from the local KLM University and their successful rate was 31%. Also, the successful rate of the rest of the applicants was 18%. Now an applicant is randomly selected and it is known that his application is successful. Using the data of last year, estimate the probability that he graduated from the KLM University.

3. (a) Employees of an Investment company attempt a test to evaluate their leadership skills after attending a training course. Among the staff who attempt the test, the mean score is 75 and the standard deviation is 8. It is assumed that the distribution of the test score is approximately normal.

   (i) Calculate the probability that a randomly selected staff has the score between 65 and 82.
   (ii) A certificate of merit will be issued to the top 5% of staff. Calculate the lowest score to be achieved in order to get the certificate of merit.
   (iii) It is known that a randomly selected staff has the test score above 62, calculate the probability that his/her test score is between 65 and 82.
   (iv) If 200 staff are randomly selected, what is the expected number of staff, in the 200, that have test score below 65?

   (b) The chef of a restaurant prepares 50 pieces of a special cake and customers can order it with set dinner by providing an additional payment. From records, 70% of customers ordered set dinner would order the special cake. If seventy customers order set dinner this evening, calculate the probability that the supply of the special cake is sufficient to cater the demand.

   (c) The number of failures of a computer system follows the Poisson distribution with a mean of once per week. Calculate the probability that the number of failures in a period of 2 weeks exceeds 3.

4. (a) The weight of a certain energy bar follows a normal distribution with a mean of 20 grams and a standard deviation of 2 grams. This energy bar is sold in packets of 24 bars each. It is specified that each packet contains at least 460 grams of energy bars. What is the probability that a randomly selected packet does not meet this specification?

   (b) The personnel manager of a company wants to estimate the annual dental expenses of its employees. The annual dental expenses of a random sample of 10 employees, in dollars, are as follows:

1100	3620	2460	850	5100
2080	1730	4250	3160	1790

   (i) Construct a 90% confidence interval for the mean annual dental expenses. State any assumption(s) and/or approximation(s) needed.
   (ii) The personnel manager also wishes to produce a point estimate of the mean annual dental expenses. Determine the sample size required if the manager wants to be 90% confident that the error of the estimate is not more than $300. State any assumption(s)/approximation(s) needed.

   (c) In an insurance company, it is required to estimate the proportion of claims that are paid within 2 months of receipt. A random sample of 200 claims is selected and it is found that 80 were paid within 2 months of receipt. Construct a 95% confidence interval for the true proportion of the claims that are paid within 2 months of receipt, and interpret your result.

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Reminder: keep a photocopy of your written solution before submission