Department of Applied Mathematics
AMA1501 Introduction to Statistics for Business / AMA1502 Introduction to Statistics
Homework 2017/2018 Semester 2
Due date: 23 March 2018 (Friday) 12:30 p.m.

1.   To investigate the online shopping behaviour of Hong Kong people, a random sample of 160 people is selected and the average amount they spend shopping online each month is summarized below:

Average Monthly Spending ($)	No. of people
0– below 200	6
200 – below 400	11
400 – below 600	18
600 – below 800	33
800 – below 1000	52
1000 –below 1200	40

(a)   Calculate the mean, median and standard deviation of the average monthly spending in the sample.

(b)   Using the results in (a), calculate the coefficient of skewness and interpret your answer briefly.

(c)   Estimate, from the frequency distribution table, the minimum amount of the top 20% average monthly spending.

(d)   Estimate, from the frequency distribution table, the number of people who spend on average between $850 to $1100 shopping online monthly.

2.   (a)   A committee will consist of President, Vice-president and four committee members.   Twenty senior managers are candidates for President and Vice-President, and fifty managers are candidates for committee members.   If the candidates are chosen at random, calculate the probability that a specific senior manager will be chosen as the President and a specific manager will be selected as committee member.

(b)   The personnel records of ISB Company show that 60% of its employees are aged 45 or below and 48% of its employees have the qualification of MBA. Among those employees aged 45 or below, 72% of them have the qualification of MBA.

(i)   Calculate the probability that a randomly selected employee of ISB Company has a qualification of MBA or aged 45 or below.

(ii)   It is known that a randomly selected employee of ISB Company is older than 45, calculate the probability that he/she has the qualification of MBA.

(iii) A randomly selected employee of ISB Company does not have the qualification of MBA, what is the probability that he/she is older than 45?

(c)   The percentages of staff members of a company assigned to its Hong Kong Island, Kowloon and New Territories offices are, respectively, 40%, 35% and 25%. Among the staff members who work on Hong Kong Island, Kowloon and the New Territories, 80%, 60% and 75%, respectively, are satisfied with the working environment. A staff member is randomly selected from the company and it is known that he/she is satisfied with the working environment. Calculate the probability that this staff member works in Hong Kong Island.

3. (a) The daily amounts of cash withdrawal from a certain automated teller machine (ATM) follow a normal distribution with a mean of $500,000 and a standard deviation of $200,000.
   (i) What is the probability that the amount of cash withdrawal from this ATM is between $380,000 and $800,000 dollars on a randomly selected day?
   (ii) The concerned bank is anticipating a cash-flow issue and needs to reduce the amount of cash supplied to this ATM. What is the minimum amount of cash needed per day if the probability of satisfying the cash withdrawal demand is at least 0.9?
   (iii) What is the probability that for this ATM, less than 65 out of 100 randomly selected days, the cash withdrawal is at least $400,000 each day?

   (b) The number of visits to museums paid by a tourist of a certain city follows a Poisson distribution with a mean of 3 per day.
   (i) What is the probability that a randomly selected tourist pays less than 3 visits in a day?
   (ii) The concerned authority of this city provides a shopping coupon to a tourist who pays at least 6 visits in a day. Suppose a randomly selected tourist will pay at least 3 visits in one day. What is the probability that this tourist will not be eligible to obtain the shopping coupon for that day?

4. (a) According to the National Statistics Department of Country A, the period of time that an American tourist stays in Country A follows a normal distribution approximately with a mean of 10.55 days and a standard deviation of 3.8 days. A random sample of 20 American tourists is selected. Find the probability that the mean period of time for this sample of tourists staying in Country A is between 8 days and 12 days.

   (b) (i) A travel agency of a certain city would like to estimate the mean expenditure of all French tourists. A random sample of eight French tourists is selected and their expenditures (in euro dollars) are listed as follows:

1650	2720	1925	3800
1940	3150	1040	2840

   Construct a 99% confidence interval for the mean expenditure of all French tourists in that city. State any required assumption(s) and / or approximation(s). Interpret your results.
   (ii) A manager of a travel agency would like to use the sample mean daily expenses to estimate the population mean daily expenses of German tourists. Suppose that the standard deviation of the daily expenses of German tourists is €500 (euro dollars). Determine the sample size required if the manager would like to be 95% confident that the error of his estimation is less than €100.

   (c) Based on the results of a survey of 1194 companies, it is found that 579 companies have investments in Country A. Construct a 98% confidence interval for the population proportion of companies that have investments in Country A.

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