Department of Applied Mathematics
AMA1501 Introduction to Statistics for Business / AMA1502 Introduction to Statistics
Homework 2015/2016 Semester 2
Due date: 18 March 2016 (Friday) 12:30 p.m.

1. The Sales Manager of a department store investigates the invoice amount paid by customers using co-branded credit card in the last month. A random sample of invoices paid by co-branded credit card in the last month is selected and their invoice amounts are shown below:

Invoice amount ($)	Frequency
Below 250	5
250 – below 500	10
500 – below 750	17
750 – below 1000	23
1000 – below 1250	36
1250 – below 1500	28
1500 – below 2000	15
2000 – below 2500	6

(a) Find the mean, median and standard deviation of the invoice amounts.
(b) Another random sample of invoices paid by customers using other credit cards in the last month has a mean of $900 and a standard deviation of $450. Discuss which type of credit card customers has a larger variation in invoice amount.
(c) Cash reward will be given to a customer when the invoice amount is at least $500. If the invoice amount is below $1500, cash reward of $50 will be given to the credit card account; otherwise cash reward of $100 will be given. Estimate, from the frequency distribution, the mean amount of cash reward per invoice.
(d) Six invoices paid by customers using co-branded credit card are selected at random. Estimate, from the frequency distribution, the probability that at least half of them have the invoice amount between $800 and $1600.

2. (a) There are nine kinds of fruits and eight kinds of vegetables. Tom is going to randomly select eight kinds of fruits or vegetables to make a salad. What is the probability that Tom's salad will contain at most two kinds of fruits?

(b) In a restaurant, the probabilities that strawberry will be contained in an appetizer and a dessert are 40% and 32%, respectively. In addition, the probability that strawberry will be contained in the appetizer or the dessert is 60%.
(i) Determine the probability that strawberry will be contained in both the appetizer and the dessert.
(ii) It is known that strawberry is contained in the dessert, what is the probability that strawberry will not be in the appetizer?
(iii) Given that strawberry is not contained in the appetizer, what is the probability that strawberry will be contained in the dessert?
(iv) On Saturdays, the probability that strawberry will be contained both in the appetizer and the dessert is 42%. It is assumed that the restaurant is opened 7 days per week. In a randomly selected day, it is found that strawberry is contained in both the appetizer and the dessert. What is the probability that the day is a Saturday?

(c)   The ISB Company has 30% investments in Country A, 30% investments in Country B and 40% investments in Country C. From the past records, the probabilities that the monthly returns were greater than 2% from Countries A, B and C were 13%, 9% and 8% respectively. Suppose that an investment will generate a monthly return greater than 2% in the next month. Calculate the probability that it will come from Country C.

3.   (a)   The daily sales amount of a shop is normally distributed with a mean of $40,000 and a standard deviation of $8,000.
      (i)   Find the probability that the daily sales amount of a randomly selected day is between $24,000 and $52,000.
      (ii)   Find the daily sales amount that is exceeded by 5% of daily sales amounts of the shop.
      (iii) What is the probability that among 100 randomly selected days, at least 70 days have daily sales amounts more than $34,400 each?

      (b)   There are 4 "super-deluxe" suites in a certain hotel. The demand of the "super-deluxe" suites follows a Poisson distribution with a mean of 3 suites per day.
      (i)   Find the probability that the demand of the "super-deluxe" suites is satisfied on a randomly selected day.
      (ii)   Given that the demand of the "super-deluxe" suites of the hotel is at least 2 in a randomly selected day, what is the probability that the hotel can satisfy the demand in that day?

4.   (a)   Suppose that the monthly tuition fee for kindergarteners in Kowloon is approximately normally distributed with a mean of $3200 and a standard deviation of $1000. If a random sample of 15 kindergarteners in Kowloon is selected, what is the probability that their average monthly tuition fee is between $2500 and $3000?

      (b)   To estimate the mean monthly tuition fee for kindergarteners in Hong Kong Island, a random sample of 10 kindergarteners is selected and their monthly tuition fees ($) are shown below:

            3150   2950   3300   3200   3500
            2980   3180   3600   3450   3360

      (i)   Construct a 95% confidence interval for the mean monthly tuition fee for kindergarteners in Hong Kong Island. State your assumptions and /or approximations. Interpret your result briefly.
      (ii)   Determine the sample size required if we want to be 95% confidence that the error of our estimate is at most $50. State your assumptions and /or approximations.

      (c)   To see how common it is for five-year-old children to learn musical instruments in Hong Kong, a random sample of 180 five-year-old children is selected. It is found that 105 of them are learning one or more musical instruments. Construct a 99% confidence interval for the true proportion of five-year-old children who are learning any musical instruments.

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Reminder: keep a photocopy of your written solution before submission