

Department of Applied Mathematics
AMA1501 Introduction to Statistics for Business / AMA1502 Introduction to Statistics /
AMA2101 Quantitative Methods for Business
Homework 2016/2017 Semester 1

Due date: 4 November 2016 (Friday) 12:30 p.m.

1. The Marketing Manager of Blossom Florist Shop investigates the expenditure of VIP customers during the recent Mega-Sales. The total amounts of expenditure (corrected to the nearest dollars) of randomly selected VIP customers are tabulated below:

Total expenditure (\$)	Number of VIP customers
0 – 199	5
200 – 299	7
300 – 399	13
400 – 499	28
500 – 599	16
600 – 799	8
800 – 999	3

- (a) Calculate the mean, mode and standard deviation of total amounts of expenditure.
- (b) Estimate, from the frequency distribution table, the minimum amount of the highest 20% total amounts of expenditure.
- (c) A VIP customer will receive cash coupon if his total amount of expenditure exceeds \$380 during Mega-Sales. Estimate, from the frequency distribution table, the proportion of VIP customers will receive cash coupon.
- (d) Twenty VIP customers are selected at random. Estimate, from the frequency distribution table, the probability that less than two of them have total amount of expenditure at most \$250.
2. (a) Daniel plans to study three elective subjects in the next semester. He is eligible to choose the subjects from the list with seven level 3 subjects and six level 4 subjects, in which five level 3 subjects and four level 4 subjects are offered by his host department and the rest are offered by other departments. Daniel decides to choose the subjects at random.
- (i) Calculate the number of selections if more level 3 subjects than level 4 subjects are selected.
- (ii) It is known that more level 3 subjects than level 4 subjects are selected, calculate the probability that all selected subjects are offered by Daniel's host department.
- (b) HotGames Ltd. has two popular games, namely, A and B. It is known that 78% of the customers would buy at least one of the two games, 55% and 47% of the customers would buy game A and game B, respectively.
- (i) Suppose a customer is randomly selected. Determine the probability that he would buy both game A and game B.
- (ii) A customer is randomly selected and knowing that he would not buy game B, what is the probability that he would buy game A?
- (iii) Game C is a less popular product and only 20% of the customers would buy it. Among the customers who would buy Game A, 83% of them would not buy Game C. Suppose a customer is randomly selected. Determine the probability that he would neither buy Game A nor Game C.

- (c) An apple wholesaler obtains apples from four different sources, S1, S2, S3 and S4. S1, S2 and S3 are all in Country A and 30%, 20% and 10% of apples are supplied by S1, S2 and S3 respectively. The rest of the apples are supplied by S4 which is in Country B. From past experience, it is known that 5%, 6%, 3% and 4% of the apples coming from S1, S2, S3 and S4, respectively, are rotten. An apple is randomly selected and it is rotten. What is the probability that it comes from S4?
3. (a) The durations of long distance calls of a multinational corporation follow a normal distribution with a mean of 240 seconds and a standard deviation of 40 seconds.
- (i) What is the probability that the duration of a randomly selected long distance call is between 160 seconds and 330 seconds?
 - (ii) Find the duration that is exceeded by 12.5% of durations of long distance calls of the corporation.
 - (iii) What is the probability that among 100 randomly selected long distance calls, more than 70 calls lasted more than 220 seconds each?
- (b) The number of chocolate chips for a certain type of cookie follows a Poisson distribution with a mean of 6 per piece of cookie. The manufacturer has decided that a cookie having less than 4 chocolate chips cannot be shipped to retailers.
- (i) What is the probability that a randomly selected piece of cookie has less than 4 chocolate chips on it?
 - (ii) Five cookies are to be randomly selected from those that cannot be shipped to retailers. Find the probability that all these 5 cookies will have exactly 3 chocolate chips each.
4. (a) Suppose for PolyU students, the average price of mobile phones they pay is \$2500 with a standard deviation of \$400. If a random sample of 45 students is selected from PolyU, what is the probability that the mean price of their mobile phone is less than \$2600?
- (b) A random sample of 8 notebook/tablet computers with the i7 processor is selected and the prices (in HK\$) of these computers are listed below:
- | | | | |
|------|-------|-------|------|
| 8500 | 9900 | 13190 | 7999 |
| 6999 | 12090 | 9890 | 8799 |
- (i) Construct a 95% confidence interval for the mean price of all notebook/tablet computers with the i7 processor. State any assumption(s)/approximation(s) used and interpret your result.
 - (ii) Determine the sample size required if we want to be 95% confident that the error of our estimate is at most HK\$500. State any assumption(s)/approximation(s) used.
- (c) In a random sample of 200 staff from PolyU, it is found that 146 of them have traveled overseas in 2014. Construct a 99% confidence interval for the true proportion of PolyU staff who have traveled overseas in 2014.

* * * **END** * * *

Reminder: keep a photocopy of your written solution before submission