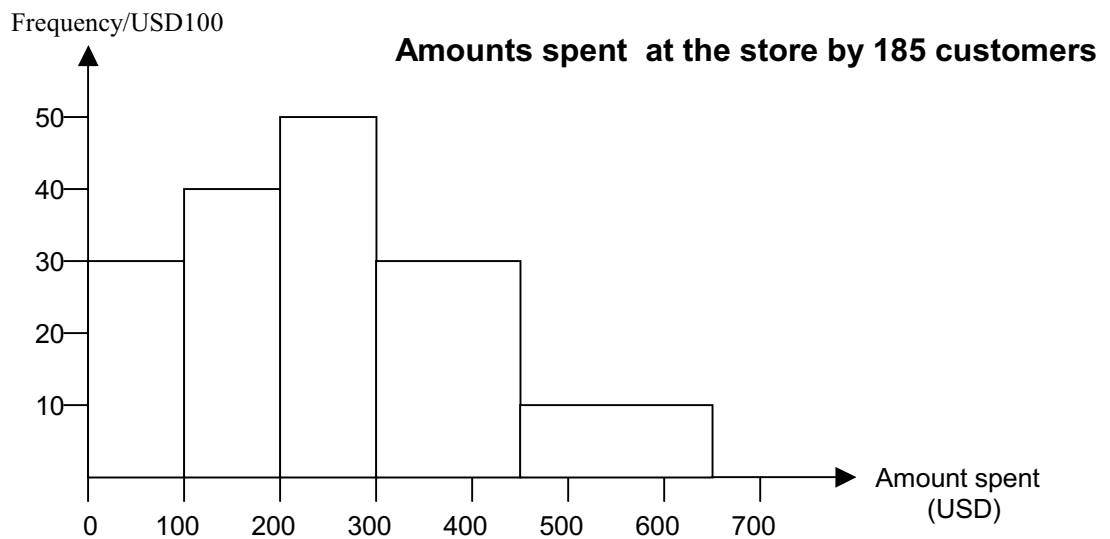


MATH 244**Applied Statistics****Mid-Term Examination****March 29, 2001****Time allowed : 75 minutes****Answer all questions.**

1. (30%) The management of an appliance store recorded the amounts spent at the store by the 185 customers who came in during the last day of the big sale. A histogram was constructed for the data.



- (a) Is the distribution symmetric, positively skewed, or negatively skewed? (5 marks)
- (b) Find the five number summary for the data. (10 marks)
- (c) Sketch the boxplot for the data. (5 marks)
- (d) A customer will be randomly selected from those who spent more than USD200 at the store on that day, with **probability directly proportional to the amount he/she spent**. A special prize will be given to this lucky customer. Suppose you had brought a CD-player from this store on that day and it costed you USD452. What is the (approximate) probability that you will win the special prize? (10 marks)

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2. (30%) Four hunters A, B, C and D, each has only one bullet, shoot simultaneously at a wild lion. The probabilities that each hunter can hit the target are 0.2, 0.4, 0.3, 0.1 respectively. Assume that their shots are independent.
- (a) What is the probability that the lion will be hit? (5 marks)
 - (b) Let X be the number of bullets that hit the lion. Find the pdf of X . (10 marks)
 - (c) Find the mean and standard deviation of X . (8 marks)
 - (d) If the lion was hit and killed by just one bullet, find the probabilities that it was killed by (i) A, (ii) B, (iii) C, (iv) D. (7 marks)
3. (20%) Customers arrive at a travel agency at a mean rate of 9 per hour in accordance with a Poisson process. Suppose the travel agency opens at 9:00am.
- (a) Find the probability that there were more than five customers arrived before 9:30am. (5 marks)
 - (b) Find the probability that there were more than five customers arrived before 9:30am, given that at least one customer arrived within that period. (8 marks)
 - (c) Suppose now you know that the first customer, Nancy, come at 9:10am. What is the probability that there were more than five customers (including Nancy) arrived before 9:30am? (7 marks)
4. (20%) Suppose that you have a biased coin which will have 0.4 probability to land on head. The coin is tossed for 9 times. In each toss, you can gain 5 dollars if the outcome is head, but will lose 3 dollars if the outcome is tail. Let X be the number of heads observed and Y be the total amount of money that you can win.
- (a) What is the distribution of X ? (2 marks)
 - (b) Find the probability that there will be more heads than tails in these 9 tosses. (5 marks)
 - (c) Find the mean and variance of Y . Is this a fair game? (9 marks)
 - (d) Find the probability that you will lose money after these 9 tosses. (4 marks)

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