KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
Term 133

STAT 319 Statistics for Engineers and Scientists

First Exam Thursday Jun 26, 2014

Please circle your instructor name

Mr. Malik Mr. Al- Sawi Mr. Saleh

Name: _____ ID #:_____Section #____

Important Note:

- Show all your work including formulas, intermediate steps and final answer

Question No	Full Marks	Marks Obtained
1	9	
2	5	
3	5	
4	3	
5	3	
6	5	
Total	30	

Q1: The probability that a computer contains a virus is 0.15, and the probability that it has a worm is 0.05. Also 17% computers have either a virus or a worm. If you scan the computer

a. Find the probability that the computer contains virus and it has a worm. (2 pts)

b. If somebody scans the computer and finds no virus, what is the probability that the computer contains a worm? (3 pts)

c. Let A: the event 'having a virus' and let B: the event 'having a worm'

i. Are the events mutually exclusive? Give a probabilistic justification. (2 pts)

ii. Are the events independent? Give a probabilistic justification. (2 pts)

Q2: Three students attempt independently to solve a difficult engineering problem. Their probabilities of successes are 50%, 40% and 20%. What is the probability that

a. None of them will solve the problem? (2 pts)

b. Only one of them will solve the problem? (3 pts)

Q3: Determine the value of c so that function $f(x)$ can serve as a probability mass function of the random variable X, then find the cumulative distribution function and expected value of the random variable X (5 pts)

$$f(x) = c\,(x^2 + 4), \qquad x = 0, 1, 2, 3$$

Q4: A large industrial firm allows a discount on any invoice that is paid within 30 days. Of all invoices, 10% receives the discount. Five invoices are sampled at random.

a. What is the probability that more than 2 sampled invoices receive the discount? (2 pts)

b. What is the expected number of invoices that receive the discount? (1 pt)

Q5: A rental car facility has 10 foreign cars and 15 domestic cars waiting to be served on a particular Saturday morning. Because there are so few mechanics working on Saturday, only 6 cars can be serviced. If the 6 cars are chosen at random

a. What is the probability that 3 of cars selected are foreign and the other are domestic? (1 pt)

b. What is the probability that at most one of the selected cars are domestic? (2 pts)

Q6: A certain federal agency employs three consulting firms A, B, and C with probabilities 0.40, 0.35, and 0.25, respectively. From past experience it is known that the probability of cost overruns for the firms are 0.05, 0.03, and 0.15, respectively.

a. What is the probability that the agency experiences a cost overrun? (3 pts)

b. Suppose a cost overrun is experienced by the agency. What is the probability that the consulting firm involved is company C? (2 pts)