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National University of Computer & Emerging Sciences

(Midterm II) Fall 2015 MT-206 Probability and Statistics (CS) Total marks: 45

Date: 3rd November, 2015 Time: 90 min.

Note: Exchange of calculators and stationary is strictly prohibited. Attempt all questions. Show each step clearly.

Question 1: (10 marks) Suppose that a person's score X on a mathematics aptitude test is a number between 0 and 1, and that his score Y on a music aptitude test is also a number between 0 and 1. Suppose further that in the population of all college students in the United States, the scores X and Y are distributed according to the following joint p.d.f.:

$$f(x,y) = \begin{cases} \frac{2}{5}(2x+3y) \text{ for } 0 \le x \le 1, \quad 0 \le y \le 1 \\ 0 \quad \text{elsewhere} \end{cases}$$

a) If a student's score on the music test is 0.3, what is the probability that his score on the mathematics test will be greater than 0.8?
b) Are X and Y independent variables? Explain.

Question 2: (5 marks) Let the random variable X denote the number of network blackouts in a day. The probability mass function of X is:

X	0	1	2
f(x)	0.7	0.2	0.1

A small internet trading company estimates that each network blackout results in a $500 loss. Find the expected loss and variance of the loss incurred in a day due to blackouts.

Question 3: (5 marks) During a particular period a university's information technology office received 20 service orders for problems with printers, of which 8 were laser printers and 12 were inkjet models. A sample of 5 of these service orders is to be selected for inclusion in a customer satisfaction survey. What is the probability that at least 3 of the selected service orders were for inkjet printers?

Question 4: (10marks) A new computer virus attacks a folder .Each file gets damaged with probability 0.2 independently of other files.
a) What is the probability that fewer than 11 files get damaged if the folder consisted of 15 files?
b) What is the probability that the fourth file attacked will be the third one to get damaged?

Question 5: (5 marks) The number of computer shutdowns during any month averaging 0.25 shutdowns per month. What is the probability of at least 3 computer shutdowns during the next year?

Question 6: (10 marks) Upgrading a certain software package requires installation of new files. Files are installed consecutively. The installation time of each file is random and is normally distributed, but on the average, it takes 15 sec to install one file, with a standard deviation of 3.317 seconds.
(a) What is the probability that a file takes more than5 seconds to install?
(b) If a file is in the top 10% of the files which take most installation time, how much time the file must have taken?