CMPU2012 **Mathematics 2**
Problem Sheet 07

In each of the following questions assume you are dealing with independent Bernouilli trials.

Q1. A commuter who drives to work each morning follows a route with seven sets of traffic lights. If the probability that any particular set of lights is red when set gets to it is 0.2 then calculate:

(i). The probability that none of the lights are red.

(ii). The probability that five or less traffic lights are red.

Q2: Suppose that it is known that 10% of the glasses made by a glass-blowing machine are defective in some way. A sample of 10 glasses is selected at random.

(i). What is the probability that none of them are defective?

(ii). What is the probability that exactly three are defective?

(iii). What is the probability that at least three are defective?

Q3. Five fair dice are rolled once.

(i). What is probability of getting at least one three?

(ii). What is the probability of getting at least two threes.

Q4. A darts team has a probability of 2/3 of winning whenever it plays. Suppose they play 5 matches. Find the probability that

(i). The team wins just one match.

(ii). The team wins exactly three matches.

(iii). The team wins no matches.

(iv). The team wins at least one match.

Q5. It is known that 5% of transistors manufactured on a certain line are below standard. A random sample of 6 is chosen. Fine the probability that

(i). All six are good transistors.

(ii). There is exactly one bad transistor.

(iii). There are at least two bad transistors.

Q6. An inspector selects a sample of 10 items at random from a batch. The items are known to have defect rate of 10%. The batch will be rejected if he finds more than 2 defective items in the sample. What is the probability that the batch will be rejected.

Q7. A prominent doctor claims that 70% of those with lung cancer are chain smokers. A sample of 10 such patents are selected are random. If his assertion is correct find the probability that fewer than half are chain smokers.

Answers:

Q1. (i). 0.2097, (ii). 0.9996

Q2. (i). 0.349, (ii). 0.0574, (iii). 0.0702

Q3. (i). 0.5981, (ii). 0.1962

Q4. (i). 0.0412, (ii). 0.3293, (iii). 0.0041, (iv). 0.9959

Q5. (i). 0.735, (ii). 0.232, (iii), 0.033

Q6. 0.0702

Q7. 0.0473