ADM2303 – Fall 2015

Assignment 1- Part 2

Question 1 (11 marks)

Pharmaceutical Drug Development. Canada has several small biotechnology companies which are research intensive and develop chemical compounds that may prove to be useful drugs, but they typically do not have the funding or global reach to test the compounds for government approval or to market drugs world-wide. Instead they sell the patents on the chemical compounds to large pharmaceutical companies to test and market. A pharmaceutical company has been buying patents from 2 biotechnology companies and the number of patents that lead to (un)successful drugs during the past 5 years for 3 categories of drug is as follows:-

Number of Patents

	BioTech Co. A		BioTech Co. B	
	Succesful	Unsuccessful	Succesful	Unsuccessful
Genetic diseases	3	15	11	32
Chemotherapy	5	26	10	35
Anti-inflammatory	35	51	11	10
Total	43	92	32	77

(a) (2 marks) Make a contingency table for number of successful patents with 3 rows for the 3 categories of drug and 2 columns for the 2 companies and give the row and column totals.

(b) (2 marks) Make a table similar to (a), this time giving the proportion of successful patents in each cell of the table. Do NOT include row or column totals.

(c) (2 marks) Draw a graph that compares the success rate (proportion of patents that lead to successful drugs) of patents bought from company A with those bought from company B for each type of drug.

(d) (2 marks) Company A says that they have provided 135 patents of which 43 were successful, a success rate of 43/135 = 31.8%. The corresponding figure for company B is 29.4%. Company A claims therefore to be more successful than company B. If you were company B, how would you respond to this claim?

(e) (3 marks) If the pharmaceutical company wants to buy a patent, which biotechnology company should they buy it from (i) for genetic diseases (ii) for chemotherapy (iii) for anti-inflammatory. State the reason for your answer.

Question 2 (11 marks)

Oil Extraction. In Canada, Provincial Governments allocate to oil companies geographical regions in which to explore for oil. If they discover oil, they do not necessarily extract the oil since the cost of extraction may be higher than the market price for oil. However the market price for oil continuously changes so that the oil may be commercially exploited at some date in the future. Oil companies own the rights to extract oil that they have discovered, but the value of that oil to the company depends on when in the future the oil price will be sufficiently high to make it worth extracting. An oil company estimates that, for a certain oil-field, the probability that the oil price will be high enough to extract the oil is given in the following table. Assume that these events are independent of each other.

Number of years in the future	Probability of oil price being sufficiently high to extract oil.
1	0.1
2	0.25
3	0.32
4	0.45
5	0.5

Calculate the probability that the oil company will *start* to extract oil (a) in year 1 (b) in year 2 (c) in year 3 (d) in year 4 (e) in year 5.

(f) Comment on whether (i) the probabilities in your answers (ii) the probabilities in the question total to more or less than 1.

Marking scheme (a) 1 mark (b) 2 marks (c) 2 marks (d) 2 marks (e) 2 marks (f) 2 marks