DEAKIN BUSINESS SCHOOL
DEPARTMENT OF INFORMATION SYSTEMS AND BUSINESS ANALYTICS

MIS775 Decision Modelling for Business Analytics Revision Questions with Solutions

WEEK 9 QUESTIONS

Exercise 1. (From *Managerial Decision Making with Spreadsheets* by Balakrishnan, Render, and Stair, Third Edn. Modified version of Q15, p. 421)

Edward Owen is responsible for maintenance, rental, and day-to-day operation of several apartment complexes in New York City. Owen is especially concerned about the cost projections for replacing air conditioner (A/C) compressors. He would like to simulate the number of A/C failures each month using data from 100 apartment buildings across New York.

No. of A/C failures per month	No. of apartment buildings
0	10
1	17
2	21
3	28
4	16
5	7
6	1

a. Determine the relative frequency for the number of A/C failures each month.

b. Suppose that the following 10 random numbers were obtained using Excel: 0.123, 0.963, 0.531, 0.809, 0.950, 0.102, 0.403, 0.458, 0.777, and 0.291.

   Use these random numbers to simulate the number of A/C failures each month over 10 months.

c. Using the simulated data, compute the average number of A/C failures each month.

d. Explain any difference between the simulated average and the average based upon the frequency distribution.

WEEK 9 SOLUTIONS

Exercise 1

a. The relative frequency is found by dividing each frequency through by the total, 100.

No. of A/C failures per month	Relative frequency
0	0.10
1	0.17
2	0.21
3	0.28
4	0.16
5	0.07
6	0.01

b. Add the cumulative relative frequencies and the intervals of random numbers to the table.

No. of A/C failures per month	Relative frequency	Cumulative relative frequency	Interval of random numbers
0	0.10	0.10	0.00 - 0.10
1	0.17	0.27	0.10 - 0.27
2	0.21	0.48	0.27 - 0.48
3	0.28	0.76	0.48 - 0.76
4	0.16	0.92	0.76 - 0.92
5	0.07	0.99	0.92 - 0.99
6	0.01	1.00	0.99 - 1.00

Create a table with the random numbers and corresponding no. of A/C failures per month.

Random numbers	No. of A/C failures per month
0.123	1
0.963	5
0.531	3
0.809	4
0.950	5
0.102	1
0.403	2
0.458	2
0.777	4
0.291	2

c. Simulated average is 29/10 = 2.9.

d. Average based on the relative frequency table
$= (0 \times 0.1) + (1 \times 0.17) + (2 \times 0.21) + \ldots + (6 \times 0.01) = 2.48.$

The difference of 0.42 is the result of having used a small number of simulated values to calculate 2.9. If the number of simulated values is increased, the simulated average will get closer and closer to 2.48.