Computing and Data Science
Simulations
Assignment no. 2
3rd Year
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1. **Perform for 10 Days in 20, 80 and 90 newspapers cases and decide which made the highest profit of 50,60,70,80, and 90. Use the random numbers stated in the section. (Use random number of 70 for 90 and of 60 for 80). Use scrap price 7 cents. Decide which is better and comment. Graph the Number of purchased items vs Profit.**

   NB: the newspaper cost is 0.33 $ and is being sold for 0.5 $ - as the section. In addition, the newspaper are bought in bundles as the section.

There are three types of news days:

Type of News	Probability
Good	0.35
Fair	0.45
Poor	0.20

the newspaper demand:

Demand	Demand Probabilities		
Demand	Good	Fair	Poor
40	0.03	0.10	0.44
50	0.05	0.18	0.22
60	0.15	0.40	0.16
70	0.20	0.20	0.12
80	0.35	0.08	0.06
90	0.15	0.04	0.00
100	0.07	0.00	0.00

random numbers:

86043 23973 66248 97697 38244 50918 55441 51217 54786 04940
50807 51453 03462 61157 65366 61130 26204 15016 85665 97714
92168 82530 19271 86999 96499 12765 20926 25282 39119
36463 07331 54590 00546 03337 41583 46439 40173 46455
47097 78780 04210 87084 44484 75377 57753 41415 09890
80400 45972 44111 99708 45935 03694 81421 60170 58457

Answer:

1. **the Cumulative Probability and represent Random Numbers forthe Type of News**

Type of News	Probability	**Cumulative Probability**	**Random Numbers**
Good	0.35	0.35	01-35
Fair	0.45	0.80	36-80
Poor	0.20	1.00	81-00

2. **the Cumulative Probability and represent Random Numbers forthe Demand-News Type Distribution**

Demand	Demand Probabilities								
Demand	Good	**Good CPF**	**Good RN**	Fair	**Fair CPF**	**Fair RN**	Poor	**Poor CPF**	**Poor RN**
40	0.03	0.03	01-03	0.10	0.10	01-10	0.44	0.44	01-44
50	0.05	0.08	04-08	0.18	0.28	11-28	0.22	0.66	45-66
60	0.15	0.23	09-23	0.40	0.68	29-68	0.16	0.82	67-82
70	0.20	0.43	23-43	0.20	0.88	69-88	0.12	0.94	83-94
80	0.35	0.78	44-78	0.08	0.96	89-96	0.06	1.00	95-00
90	0.15	0.93	79-93	0.04	1.00	97-00	0.00	-	-
100	0.07	1.00	94-00	0.00	-	-	0.00	-	-

A. First, the simulation is to run for 10 days with the 80 newspapers purchase order.

Note:

1- **Revenue = D * 0.5**
2- **Cost = 80 * 0.33 = 26.4**
3- **Scrap = (80 – D) * 0.05**

Day	RN for NT	News Type	RN for Demand	Demand	Revenue from Sales	Cost of NPs	Lost Profit	Scrap Revenue	Daily Profit
1	54	Fair	78	70	35	26.4	-	0.5	9.1
2	60	Fair	49	60	30	26.4	-	1	4.6
3	40	Fair	50	60	30	26.4	-	1	4.6
4	80	Fair	75	70	35	26.4	-	0.5	9.1
5	14	Good	53	80	40	26.4	-	-	13.6
6	03	Good	46	80	40	26.4	-	-	13.6
7	26	Good	11	60	30	26.4	-	1	4.6
8	57	Fair	65	60	30	26.4	-	1	4.6
9	36	Fair	66	60	30	26.4	-	1	4.6
10	11	Good	30	70	35	26.4	-	0.5	9.1

Total profit 80 = $\sum daily\ profit$ = 77.5 $

B. Secondly, the simulation is to run for 10 days with the 90 newspapers purchase order.

Note:

1- Revenue = D * 0.5

2- Cost = 90 * 0.33 = 29.7

3- Scrap = (90 – D) * 0.05

Day	RN for NT	News Type	RN for Demand	Demand	Revenue from Sales	Cost of NPs	Lost Profit	Scrap Revenue	Daily Profit
1	86	Poor	04	40	20	29.7	-	2.5	-7.2
2	32	Good	39	70	35	29.7	-	1	6.3
3	73	Fair	66	60	30	29.7	-	1.5	1.8
4	24	Good	89	90	45	29.7	-	-	15.3
5	76	Fair	97	90	45	29.7	-	-	15.3
6	38	Fair	24	50	25	29.7	-	2	-2.7
7	45	Fair	09	40	20	29.7	-	2.5	-7.2
8	18	Good	55	80	40	29.7	-	0.5	10.8
9	44	Fair	15	50	25	29.7	-	2	-2.7
10	12	Good	17	60	30	29.7	-	1.5	1.8

Total profit of 90 = $\sum daily\ profit$ = 31.5 $

Since:

1. total profit of 50 = 51.9 $
2. total profit of 60 = 94.9 $
3. total profit of 70 = 56.5 $
4. total profit of 80 = 77.5 $
5. total profit of 90 = 31.5 $

the best profit is when buying 60 newspapers = 94.9