Newspaper seller's problem

A classical inventory problem concerns the purchase and sale of newspapers. The paper seller buys the papers for 33 cents each and sells then for 50 cents each. Newspapers not sold at the end of the day are sold as scrap for 5 cents each. Newspapers can be purchased in bundles of 10. Thus, the paper seller can buy 50,60 and so on. There are three types of news days, "good" , "fair" and "poor" with probabilities of 0.35,0.45 and 0.20, respectively. The distribution of papers demanded on each of the three days is given in Table 1 below. Simulate the demand for 10 days and record profit from sales each day. Find the optimal number of papers the newspaper seller should purchase. Assume the newsstand buys 70 newspapers each day.

Table 1. Distribution of Newspapers Demanded

DEMAND	Demand Probability Distribution		
	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 digits for type of news days: 58,17,21,45,43,36, 27,73,86,19.

Random digits for demand 93,63,31,19,91,75,84,37,23,02

Table-1 Random digit assignment of types of news day

News day	Probability	Cumulative probability	Random digit assignment
Good	0.35	0.35	
Fair	0.45	0.80	
Poor	0.20	1.00	

Table-1 Random digit assignment of types of news day

News day	Probability	Cumulative probability	Random digit assignment
Good	0.35	0.35	1-35
Fair	0.45	0.80	36-80
Poor	0.20	1.00	81-00

Table 2- Random digit assignment for newspaper demand

Demand	Probability			Cumulative probability			Random Digit Assignment		
	Good	Fair	Poor	Good	Fair	Poor	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						

Table 2- Random digit assignment for newspaper demand

Demand	Probability			Cumulative probability			Random Digit Assignment		
	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor
40	0.03	0.10	0.44	0.03	0.10	0.44	1-3	1-10	1-44
50	0.05	0.18	0.22	0.08	0.28	0.66	4-8	11-28	45-66
60	0.15	0.40	0.16	0.23	0.68	0.82	9-23	29-68	67-82
70	0.20	0.20	0.12	0.43	0.88	0.94	24-43	69-88	83-94
80	0.35	0.08	0.06	0.78	0.96	1.00	44-78	89-96	95-00
90	0.15	0.04	0.00	0.93	1.00	1.00	79-93	97-00	-
100	0.07	0.00	0.00	1.00	1.00	1.00	94-00	-	-

- Revenue from sales= Max limit of newspaper*Selling price

- Daily profit=(revenue from sales)-(cost of newspaper)-(loss profit from excess demand)+(salvage from sale of scrap papers)

Table 3 Simulation table 70 newspapers for10 days

Day	Random digit for type of news day	Type of news days	Random digit for demand	demand	Revenue from sales	Loss profit from excess demand	Salvage from sales of scrap	Daily profit
1	58		93					
2	17		63					
3	21		31					
4	45		19					
5	43		91					
6	36		75					
7	27		84					
8	73		37					
9	86		23					
10	19		02					

Table 3 Simulation table 70 newspapers for10 days

Day	Random digit for type of news day	Type of news days	Random digit for demand	demand	Revenue from sales	Loss profit from excess demand	Salvage from sales of scrap	Daily profit
1	58	Fair	93					
2	17	Good	63					
3	21	Good	31					
4	45	Fair	19					
5	43	Fair	91					
6	36	Fair	75					
7	27	Good	84					
8	73	Fair	37					
9	86	Poor	23					
10	19	Good	02					

Table 3 Simulation table 70 newspapers for10 days

Day	Random digit for type of news day	Type of news days	Random digit for demand	demand	Revenue from sales	Loss profit from excess demand	Salvage from sales of scrap	Daily profit
1	58	Fair	93	80				
2	17	Good	63	80				
3	21	Good	31	70				
4	45	Fair	19	50				
5	43	Fair	91	80				
6	36	Fair	75	70				
7	27	Good	84	90				
8	73	Fair	37	60				
9	86	Poor	23	40				
10	19	Good	02	40				

Table 3 Simulation table 70 newspapers for10 days

Day	Random digit for type of news day	Type of news days	Random digit for demand	demand	Revenue from sales	Loss profit from excess demand	Salvage from sales of scrap	Daily profit
1	58	Fair	93	80	35			
2	17	Good	63	80	35			
3	21	Good	31	70	35			
4	45	Fair	19	50	25			
5	43	Fair	91	80	35			
6	36	Fair	75	70	35			
7	27	Good	84	90	35			
8	73	Fair	37	60	30			
9	86	Poor	23	40	20			
10	19	Good	02	40	20			

Table 3 Simulation table 70 newspapers for10 days

Day	Random digit for type of news day	Type of news days	Random digit for demand	demand	Revenue from sales	Loss profit from excess demand	Salvage from sales of scrap	Daily profit
1	58	Fair	93	80	35	1.7		
2	17	Good	63	80	35	1.7		
3	21	Good	31	70	35	-		
4	45	Fair	19	50	25	-		
5	43	Fair	91	80	35	1.7		
6	36	Fair	75	70	35	-		
7	27	Good	84	90	35	3.4		
8	73	Fair	37	60	30	-		
9	86	Poor	23	40	20	-		
10	19	Good	02	40	20	-		

Table 3 Simulation table 70 newspapers for10 days

Day	Random digit for type of news day	Type of news days	Random digit for demand	demand	Revenue from sales	Loss profit from excess demand	Salvage from sales of scrap	Daily profit
1	58	Fair	93	80	35	1.7	-	
2	17	Good	63	80	35	1.7	-	
3	21	Good	31	70	35	-	-	
4	45	Fair	19	50	25	-	1	
5	43	Fair	91	80	35	1.7	-	
6	36	Fair	75	70	35	-	-	
7	27	Good	84	90	35	3.4	-	
8	73	Fair	37	60	30	-	0.5	
9	86	Poor	23	40	20	-	1.5	
10	19	Good	02	40	20	-	1.5	

Table 3 Simulation table 70 newspapers for10 days

Day	Random digit for type of news day	Type of news days	Random digit for demand	demand	Revenue from sales	Loss profit from excess demand	Salvage from sales of scrap	Daily profit
1	58	Fair	93	80	35	1.7	-	10.20
2	17	Good	63	80	35	1.7	-	10.20
3	21	Good	31	70	35	-	-	11.90
4	45	Fair	19	50	25	-	1	2.9
5	43	Fair	91	80	35	1.7	-	10.20
6	36	Fair	75	70	35	-	-	11.90
7	27	Good	84	90	35	3.4	-	8.50
8	73	Fair	37	60	30	-	0.5	7.40
9	86	Poor	23	40	20	-	1.5	-1.60
10	19	Good	02	40	20	-	1.5	-1.60

1) **Simulate the demand for 10 days and record profit from sales each day? ANS: 70rupees**
2) **Find the optimal number of papers the newspaper seller should purchase? ANS: demand(80)**

Thankyou