# SC311 <br> Modeling and Simulation 

## Lecture 06

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## Chapter 4: Inventory Simulation

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كلية الحاسبات والذكاء الإصطناعي
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- Introduction.
- Simulating of Inventory System.
- The Newspaper Seller's Problem.


## Sim. of Inventory System(12/13)

## كلية الحاسبات والذكاء الإصطناعي

## Simulation Table (5 Cycles)

| Cycle | Day | Beginning <br> Inventory | Random <br> Digits for <br> Demand | Demand | Ending Inventory | Shortage Quantity | Order <br> Quantity | Random <br> Digits for <br> Lead Time | Days until Order Arrives |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 1 | 3 | 24 | 1 | 2 | 0 | - | - | 1 |
|  | 2 | 2 | 35 | 1 | 1 | 0 | - | - | 0 |
|  | 3 | 9 | 65 | 2 | 7 | 0 | - | - | - |
|  | 4 | 7 | 81 | 3 | 4 | 0 | - | - | - |
|  | 5 | 4 | 54 | 2 | 2 | 0 | 9 | 5 | 1 |
| 2 | 1 | 2 | 03 | 0 | 2 | 0 | - | - | 0 |
|  | 2 | 11 | 87 | 3 | 8 | 0 | - | - | - |
|  | 3 | 8 | 27 | 1 | 7 | 0 | - | - | - |
|  | 4 | 7 | 73 | 3 | 4 | 0 | - | - | - |
|  | 5 | 4 | 70 | 2 | 2 | 0 | 9 | 0 | 3 |
| 3 | 1 | 2 | 47 | 2 | 0 | 0 | - | - | 2 |
|  | 2 | 0 | 45 | 2 | 0 | 2 | - | - | 1 |
|  | 3 | 0 | 48 | 2 | 0 | 4 | - | - | 0 |
|  | 4 | 9 | 17 | 1 | 4 | 0 | - | - | - |
|  | 5 | 4 | 09 | 0 | 4 | 0 | 7 | 3 | 1 |
| 4 | 1 | 4 | 42 | 2 | 2 | 0 | - | - | 0 |
|  | 2 | 9 | 87 | 3 | 6 | 0 | - | - | - |
|  | 3 | 6 | 26 | 1 | 5 | 0 | - | - | - |
|  | 4 | 5 | 36 | 2 | 3 | 0 | - | - | - |
|  | 5 | 3 | 40 | 2 | 1 | 0 | 10 | 4 | 1 |
| 5 | 1 | 1 | 07 | 0 | 1 | 0 | - | - | 0 |
|  | 2 | 11 | 63 | 2 | 9 | 0 | - | - | - |
|  | 3 | 9 | 19 | 1 | 8 | 0 | - | - | - |
|  | 4 | 8 | 88 | 3 | 5 | 0 | - | - | - |
|  | 5 | 5 | 94 | 4 | $\frac{1}{88}$ | 0 | 10 | 8 | 2 |

## Sim. of Inventory System(13/13)

## Performance analysis:

- Based on five cycles of simulation, the average ending inventory is approximately $3.5(88 \div 25)$ units.
- On 2 of 25 days a shortage condition existed.
- For large number of cycles, the computer is used.


## YOUR TURN

## Bonus Question:

## In the previous example:

## Programmatic +2

- Perform the simulation for 10 cycles.
- Plot a graph for this simulation.
$>$ (Time, Amount in inventory)
- Submit your answer (Due Date: 6-April-2023)
> https://docs.google.com/forms/d/e/1FAIpQLSfxnJfAK Mgo8cgC8RosczNjYYqwOPR3auqeznR4PiKqc5iNA ink


## Note: Graph

## كلية الحاسبات والذكاء الإصطناعي

| Cycle | Day | Beginning <br> Inventory | Random <br> Digits for <br> Demand | Demand |  | Shortage <br> Quantity |  Random <br> Order <br> Quantity <br> Digits for  <br> Lead Time  | Days until Order Arrives |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | $\begin{aligned} & 1 \\ & 2 \\ & 3 \\ & 4 \\ & 5 \end{aligned}$ | 3 2 9 7 4 | 24 35 65 81 54 | 1 1 2 3 2 | 2 1 7 4 2 | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | Amount: $y$-Axis | 1 0 - - 1 |
| 2 | 1 2 3 4 5 | 2 11 8 7 4 | 03 87 27 73 70 | 0 3 1 3 2 | $\begin{aligned} & 2 \\ & 8 \\ & 7 \\ & 4 \\ & 2 \end{aligned}$ | $\begin{aligned} & \hline 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | - - <br> - - <br> - - <br> - - <br> 9 0 | $\begin{gathered} 0 \\ - \\ - \\ - \end{gathered}$ |
| 3 | $\begin{aligned} & 1 \\ & 2 \\ & 3 \\ & 4 \\ & 5 \end{aligned}$ | 2 <br> 0 <br> 0 <br> 9 <br> 4 | 47 45 48 17 09 | $\begin{aligned} & 2 \\ & 2 \\ & 2 \\ & 1 \\ & 0 \\ & \hline \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 4 \\ & 4 \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline 0 \\ & 2 \\ & 4 \\ & 0 \\ & 0 \\ & \hline \end{aligned}$ |  |  |
| 4 | 1 2 3 4 5 | Tim <br> 6 <br> 5 <br> 3 | $\boldsymbol{x}$-Axis <br> 26 <br> 36 <br> 40 | $\begin{aligned} & 2 \\ & 3 \\ & 1 \\ & 2 \\ & 2 \\ & 2 \end{aligned}$ | $\begin{aligned} & 2 \\ & 6 \\ & 5 \\ & 3 \\ & 1 \\ & \hline \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ |  |  |
| 5 | 1 2 3 4 5 | 1 11 9 8 5 | 07 63 19 88 94 | 0 2 1 3 4 | $\begin{aligned} & 1 \\ & 9 \\ & 8 \\ & 5 \\ & 1 \end{aligned}$ | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ |  |  |
|  |  | 54.4 |  |  |  |  |  |  |

## The Newspaper Seller (1/8)

## The Newspaper Seller's Problem (1/2):

- A classical inventory problem concerns the purchase and sale of newspapers.
- The paper seller buys the papers for 33 cents each and sells them 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 $10,20, \ldots, 60, \ldots$ and so on.


## The Newspaper Seller (1/8)

## The Newspaper Seller's Problem (2/2):

- There are three types of newsdays, "good," "fair," and "poor," with probabilities of $0.35,0.45$, and 0.20 , respectively.
- The problem is to determine the optimal number of papers the newspaper seller should purchase.


## The Newspaper Seller (2/8)

## Random-Digit Assignment for Type of Newsday

|  |  |
| :---: | :---: |
| Type of Newsday | Probability |
| Good | 0.35 |
| Fair | 0.45 |
| Poor | 0.20 |

## The Newspaper Seller (2/8)

## Random-Digit Assignment for Type of Newsday

|  |  | Cumulative <br> Type of Newsday | Random-Digit <br> Probability |
| :---: | :---: | :---: | :---: |
| Probability | Assignment |  |  |

## The Newspaper Seller (3/8)

## Random-Digit Assignment for Type of Newsday

|  |  | Cumulative | Random-Digit <br> Type of Newsday |
| :---: | :---: | :---: | :---: |
| Probability | Probability | Assignment |  |

## Distribution of Newspapers Demanded

|  | Demand Probability Distribution |  |  |
| :---: | :---: | :---: | :---: |
| 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 |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

|  | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |
| :---: | :--- | :--- | :--- | :--- | :--- |
| Demand | Good | Fair | Poor | Good | Fair | Poor |  |  |  |  |  |
| :---: | :--- | :--- | :--- | :--- |
| 40 |  |  |  |  |
| 50 |  |  |  |  |
| 60 |  |  |  |  |
| 70 |  |  |  |  |
| 80 |  |  |  |  |
| 90 |  |  |  |  |
| 100 |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

| Demand | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Good | Fair Poor | Good | Fair | Poor |
| 40 | 0.03 | Demand | Demand Probability Distribution |  |  |
| 50 | 0.08 |  | Good | Fair | Poor |
| 60 | 0.23 | 40 | 0.03 | 0.10 | 0.44 |
| 70 | 0.43 | 50 | 0.05 | 0.18 | 0.22 |
| 80 | 0.78 | 60 | 0.15 | 0.40 | 0.16 |
| 90 |  | 70 | 0.20 | 0.20 | 0.12 |
| 90 | 0.93 | 80 | 0.35 | 0.08 | 0.06 |
| 100 | 1.00 | 90 | 0.15 | 0.04 | 0.00 |
|  |  | 100 | 0.07 | 0.00 | 0.00 |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

| Demand | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Good | Fair | Poor | Good | Fair | Poor |
| 40 | 0.03 |  |  | 01-03 |  |  |
| 50 | 0.08 |  |  | 04-08 |  |  |
| 60 | 0.23 |  |  | 09-23 |  |  |
| 70 | 0.43 |  |  | 24-43 |  |  |
| 80 | 0.78 |  |  | 44-78 |  |  |
| 90 | 0.93 |  |  | 79-93 |  |  |
| 100 | 1.00 |  |  | 94-00 |  |  |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

| Demand | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Good | Fair | Poor | Good | Fair | Poor |
| 40 | 0.03 | 0.10 | Demand | Demand Probability Distribution |  |  |
| 50 | 0.08 | 0.28 |  | Good | Fair | Poor |
| 60 | 0.23 | 0.68 | 40 | 0.03 | 0.10 | 0.44 |
| 70 | 0.43 | 0.88 | 50 | 0.05 | 0.18 | 0.22 |
| 80 | 0.78 | 0.96 | 60 | 0.15 | 0.40 | 0.16 |
| 90 | 0.93 | 1.00 | 70 | 0.20 | 0.20 | 0.12 |
| 90 | 0.93 | 1.00 | 80 | 0.35 | 0.08 | 0.06 |
| 100 | 1.00 | 1.00 | 90 | 0.15 | 0.04 | 0.00 |
|  |  |  | 100 | 0.07 | 0.00 | 0.00 |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

| Demand | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Good | Fair | Poor | Good | Fair | Poor |
| 40 | 0.03 0.10 <br> 0.08 0.28 <br> 0.23 0.68 <br> 0.43 0.88 <br> 0.78 0.96 <br> 0.93 1.00 <br> 1.00 1.00 |  | Demand | Demand Probability Distribution |  |  |
| 50 |  |  | Good | Fair | Poor |
| 60 |  |  | 40 | 0.03 | 0.10 | 0.44 |
| 70 |  |  | 50 | 0.05 | 0.18 | 0.22 |
| 80 |  |  | 60 | 0.15 | 0.40 | 0.16 |
| 90 |  |  | 70 | 0.20 | 0.20 | 0.12 |
| 90 |  |  | 80 | 0.35 | 0.08 | 0.06 |
| 100 |  |  | 90 | 0.15 | 0.04 | 0.00 |
|  |  |  | 100 | 0.07 | 0.00 | 0.00 |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

| Demand | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Good | Fair | Poor | Good | air | Poor |
| 40 | 0.03 0.10 <br> 0.08 0.28 <br> 0.23 0.68 <br> 0.43 0.88 <br> 0.78 0.96 <br> 0.93 1.00 <br> 1.00  |  | Demand | Demand Probability Distribution |  |  |
| 50 |  |  | Good | Fair | Poor |
| 60 |  |  | 40 | 0.03 | 0.10 | 0.44 |
| 70 |  |  | 50 | 0.05 | 0.18 | 0.22 |
| 80 |  |  | 60 | 0.15 | 0.40 | 0.16 |
| 90 |  |  | 70 | 0.20 | 0.20 | 0.12 |
| 90 |  |  | 80 | 0.35 | 0.08 | 0.06 |
| 100 |  |  | 90 | 0.15 | 0.04 | 0.00 |
|  |  |  |  | 100 | 0.07 | 0.00 | 0.00 |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

|  | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :--- |
| Demand | Good | Fair | Poor | Good | Fair |
| Poor |  |  |  |  |  |
| 40 | 0.03 | 0.10 | $01-03$ | $01-10$ |  |
| 50 | 0.08 | 0.28 | $04-08$ | $11-28$ |  |
| 60 | 0.23 | 0.68 | $09-23$ | $29-68$ |  |
| 70 | 0.43 | 0.88 | $24-43$ | $69-88$ |  |
| 80 | 0.78 | 0.96 | $44-78$ | $89-96$ |  |
| 90 | 0.93 | 1.00 | $79-93$ | $97-00$ |  |
| 100 | 1.00 |  | $94-00$ |  |  |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

| Demand | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Good | Fair | Poor | Good | Fair | Poor |  |
| 40 | 0.03 | $\begin{array}{ll} \hline 0.10 & 0.44 \\ 0.28 & 0.66 \end{array}$ |  | Demand | Demand Probability Distribution |  |  |
| 50 | 0.08 |  |  | Good | Fair | Poor |
| 60 | 0.23 | 0.68 | 0.82 |  | 40 | 0.03 | 0.10 | 0.44 |
| 70 | 0.43 | 0.88 | 0.94 | 50 | 0.05 | 0.18 | 0.22 |
| 80 | 0.78 | 0.96 | 1.00 | 60 | 0.15 | 0.40 | 0.16 |
| 90 |  |  | 1.00 | 70 | 0.20 | 0.20 | 0.12 |
| 90 | 0.93 | 1.00 | 1.00 | 80 | 0.35 | 0.08 | 0.06 |
| 100 | 1.00 |  | 1.00 | 90 | 0.15 | 0.04 | 0.00 |
|  |  |  |  | 100 | 0.07 | 0.00 | 0.00 |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

| Demand | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Good | Fair | Poor | Good | Fair | Po |  |
| 40 | 0.03 | 0.10 0.44 <br> 0.28 0.66 <br> 0.68 0.82 <br> 0.88 0.94 <br> 0.96 1.00 <br> 1.00 1.00 <br>  1.00 |  | Demand | Demand Probability Distribution |  |  |
| 50 | 0.08 |  |  | Good | Fair | Poor |
| 60 | 0.23 |  |  | 40 | 0.03 | 0.10 | 0.44 |
| 70 | 0.43 |  |  | 50 | 0.05 | 0.18 | 0.22 |
| 80 | 0.78 |  |  | 60 | 0.15 | 0.40 | 0.16 |
|  |  |  |  | 70 | 0.20 | 0.20 | 0.12 |
| 90 | 0.93 |  |  | 80 | 0.35 | 0.08 | 0.06 |
| 100 | 1.00 |  |  | 90 | 0.15 | 0.04 | 0.00 |
|  |  |  |  | 100 | 0.07 | 0.00 | 0.00 |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

| Demand | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Good | Fair | Poor | Good | Fair | Poor |  |
| 40 | 0.03 | $\begin{array}{ll} \hline 0.10 & 0.44 \\ 0.28 & 0.66 \end{array}$ |  | Demand | Demand Probability Distribution |  |  |
| 50 | 0.08 |  |  | Good | Fair | Poor |
| 60 | 0.23 | 0.68 | 0.82 |  | 40 | 0.03 | 0.10 | 0.44 |
| 70 | 0.43 | 0.88 | 0.94 | 50 | 0.05 | 0.18 | 0.22 |
| 80 | 0.78 | 0.96 | 1.00 | 60 | 0.15 | 0.40 | 0.16 |
| 90 | 0.93 | 1.00 |  | 70 | 0.20 | 0.20 | 0.12 |
| 90 | 0.93 | 1.00 |  | 80 | 0.35 | 0.08 | 0.06 |
| 100 | 1.00 |  |  | 90 | 0.15 | 0.04 | 0.00 |
|  |  |  |  | 100 | 0.07 | 0.00 | 0.00 |

## The Newspaper Seller (4/8)

## Random-Digit Assignments for Newspapers Demanded

|  | Cumulative DistributionRandom-Digit Assignment |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Demand | Good | Fair | Poor | Good | Fair | Poor |
| 40 | 0.03 | 0.10 | 0.44 | $01-03$ | $01-10$ | $01-44$ |
| 50 | 0.08 | 0.28 | 0.66 | $04-08$ | $11-28$ | $45-66$ |
| 60 | 0.23 | 0.68 | 0.82 | $09-23$ | $29-68$ | $67-82$ |
| 70 | 0.43 | 0.88 | 0.94 | $24-43$ | $69-88$ | $83-94$ |
| 80 | 0.78 | 0.96 | 1.00 | $44-78$ | $89-96$ | $95-00$ |
| 90 | 0.93 | 1.00 |  | $79-93$ | $97-00$ |  |
| 100 | 1.00 |  |  | $94-00$ |  |  |

## The Newspaper Seller (4/8)

- The profits are given by the following relationship:

$$
\begin{aligned}
& \hline \text { Profit }=\binom{\text { revenue }}{\text { from sales }}-\binom{\text { cost of }}{\text { newspapers }} \\
& \quad-\binom{\text { lost profit from }}{\text { excess demand }}+\binom{\text { salvage from sale }}{\text { of scrap papers }}
\end{aligned}
$$

- This will be accomplished by simulating demands for 20 days and recording profits from sales each day. The policy (number of newspapers purchased) is changed to other values and the simulation repeated until the best value is found.


## The Newspaper Seller (5/8)

## كلية الحاسبات والذكاء الإصطناعي

## Simulation Table (70 newspapers, 20 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Day | Random |  |  |  |  | **0.33 $=\$ 23.10$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Digits for |  | Random |  | Revenue from | Lost Profit | Salvage |  |
|  | Type of | Type of | Digits for |  |  | from Excess | from Sale | Daily |
|  | Newsday | Newsday | Demand | Demand | Sales | Demand | of Scrap | Profit |
| 1 | 94 | Poor | 80 | 60 | \$30.00 | - | \$0.50 | \$7.40 |
| 2 | 77 | Fair | 20 | 50 | 25.00 | - | 1.00 | 2.90 |
| 3 | 49 | Fair | 15 | 50 | 25.00 | - | 1.00 | 2.90 |
| 4 | 45 | Fair | 88 | 70 | 35.00 | - | - | 11.90 |
| 5 | 43 | Fair | 98 | 90 | 35.00 | \$3.40 | - | 8.50 |
| 6 | 32 | Good | 65 | 80 | 35.00 | 1.70 | - | 10.20 |
| 7 | 49 | Fair | 86 | 70 | 35.00 | - | - | 11.90 |
| 8 | 00 | Poor | 73 | 60 | 30.00 | - | 0.50 | 7.40 |
| 9 | 16 | Good | 24 | 70 | 35.00 | - | - | 11.90 |
| 10 | 24 | Good | 60 | 80 | 35.00 | 1.70 | - | 10.20 |
| 11 | 31 | Good | 60 | 80 | 35.00 | 1.70 | - | 10.20 |
| 12 | 14 | Good | 29 | 70 | 35.00 | - | - | 11.90 |
| 13 | 41 | Fair | 18 | 50 | 25.00 | - | 1.00 | 2.90 |
| 14 | 61 | Fair | 90 | 80 | 35.00 | 1.70 | - | 10.20 |
| 15 | 85 | Poor | 93 | 70 | 35.00 | - | - | 11.90 |
| 16 | 08 | Good | 73 | 80 | 35.00 | 1.70 | - | 10.20 |
| 17 | 15 | Good | 21 | 60 | 30.00 | - | 0.50 | 7.40 |
| 18 | 97 | Poor | 45 | 50 | 25.00 | - | 1.00 | 2.90 |
| 19 | 52 | Fair | 76 | 70 | 35.00 | - | - | 11.90 |
| 20 | 78 | Fair | 96 | 80 | 35.00 | 1.70 | - | 10.20 |
|  |  |  |  |  | \$645.00 | \$13.60 | \$5.50 | \$174.90 |

## The Newspaper Seller (6/8)

## Simulation Table (in the question)

| Day | Random |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Digits for |  | Random |  | Revenue | Lost Profit | Salvage |  |
|  | Type of | Type of | Digits for |  | from | from Excess | from Sole | Daily |
|  | Newsday | Newsday | Demand | Demand | Sales | Demand | of Scrap | Profit |
| 1 | 94 |  | 80 |  |  |  |  |  |
| 2 | 77 |  | 20 |  |  |  |  |  |
| 3 | 49 |  | 15 |  |  |  |  |  |
| 4 | 45 |  | 88 |  |  |  |  |  |
| 5 | 43 |  | 98 |  |  |  |  |  |
| 6 | 32 |  | 65 |  |  |  |  |  |
| 7 | 49 |  | 86 |  |  |  |  |  |
| 8 | 00 |  | 73 |  |  |  |  |  |

## The Newspaper Seller (6/8)

## Simulation Table (in the question)

|  | Random <br> Digits for <br> Type of <br> Newsday | Type of <br> Newsday | Random <br> Digits for <br> Demand | Demand | Revenlue <br> from <br> Sales | Lost Profit <br> from Excess Denmend | Salvage <br> from Sale <br> of Scrap | Daily <br> Profit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 94 |  | 80 |  |  |  |  |  |
| 2 | 77 |  | 20 |  |  |  |  |  |
| 3 | 49 |  | 15 |  |  |  |  |  |
| 4 | 45 |  | 88 |  |  |  |  |  |
| 5 | 43 |  | 98 |  |  |  |  |  |
| 6 | 32 |  | 65 |  |  |  |  |  |
| 7 | 49 |  | 86 |  |  |  |  |  |
| 8 | 00 |  | 73 |  |  |  |  |  |

## The Newspaper Seller (6/8)

## Simulation Table (in the question)



## The Newspaper Seller (6/8)

## Simulation Table (in the question)

| Day | Random <br> Digitis for <br> Type of <br> Newsday | Type of Newsday | Random <br> Digits for <br> Denfand | Demand | Revenle <br> from <br> Sales | Losi Profii <br> from Excess <br> Demand | Salvage <br> from Sale <br> of Scrap | Daily <br> Profit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 94 |  |  |  |  |  |  |  |
| 2 | 77 |  |  |  |  |  |  |  |
| 3 | 49 |  |  |  |  |  |  |  |
| 4 | 45 |  | 88 |  |  |  |  |  |
| 5 | 43 |  | 98 |  |  |  |  |  |
| 6 | 32 |  | 65 |  |  |  |  |  |
| 7 | 49 |  | 86 |  |  |  |  |  |
| 8 | 00 |  | 73 |  |  |  |  |  |

## The Newspaper Seller (6/8)

## Simulation Table (in the question)

| Day | Random <br> Digits for <br> Type of <br> Newsday | Type of Newsday | Random <br> Digits for <br> Demand |  | from <br> Sales | Lost Profit fom Excess Demand | Salvage <br> from Sale <br> of Scrap | Dialy Profit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 94 |  | 80 |  |  |  |  |  |
| 2 | 77 |  | 20 |  |  |  |  |  |
| 3 | 49 |  | 15 |  |  |  |  |  |
| 4 | 45 |  | 88 |  |  |  |  |  |
| 5 | 43 |  | 98 |  |  |  |  |  |
| 6 | 32 |  | 65 |  |  |  |  |  |
| 7 | 49 |  | 86 |  |  |  |  |  |
| 8 | 00 |  | 73 |  |  |  |  |  |

## The Newspaper Seller (6/8)

Simulation Table (in the question)


## The Newspaper Seller (6/8)

## Simulation Table (in the question)



## The Newspaper Seller (6/8)

## Simulation Table (in the question)

| Day | Random <br> Digits for <br> Type of <br> Newsday | Type of Newshay | $\begin{aligned} & \text { Remblom } \\ & \text { Digisfor } \\ & \text { Denuand } \\ & \hline \end{aligned}$ |  | $\begin{aligned} & \text { Revemen } \\ & \text { from } \\ & \text { Sales } \end{aligned}$ | Losi Profit from Excess Demand | $\begin{aligned} & \text { Saluye } \\ & \text { from Sde } \\ & \text { ofscrup } \end{aligned}$ | Daily <br> Profit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 4 |  | 80 |  |  |  |  |  |
| 2 | 77 |  | 20 |  | - |  |  |  |
| 3 | $\text { Profit }=\binom{\text { revenue }}{\text { from sales }}-\binom{\text { cost of }}{\text { newspapers }}$ |  |  |  |  |  |  |  |
| 5 |  |  | $-\binom{$ lost profit from }{ excess demand }$+\binom{$ salvage from sale }{ of scrap papers } |  |  |  |  |  |
| 1 | 49 |  | 86 |  |  |  |  |  |
| 8 | 0 |  | 13 |  |  |  |  |  |

## The Newspaper Seller (7/8)

## Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Day | Random <br> Digits or <br> Type of <br> Newslay | Type of <br> Nevsslay | Random <br> Digitisfor <br> Demennd | Demand | Reventule <br> from Sales | Losis Projil <br> from Excess <br> Demend | Salvage <br> from Sole <br> of Scriap | Daily <br> Profit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 14 |  | 80 |  |  |  |  |  |
| 2 | 77 |  | 21) |  |  |  |  |  |
| 3 | 4) |  | 15 |  |  |  |  |  |
| 4 | 45 |  | 88 |  |  |  |  |  |
| $j$ | 43 |  | 98 |  |  |  |  |  |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| D | Rundom |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Digitis for <br> Type of <br> Nensdy | Type of <br> Nevslay | Rundom <br> Digitisfor <br> Demind | Cumulative Random-Digit <br> Type of Newsday Probability Probability Assigmment |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  | Good | 0.35 | 0.35 | 01-35 |
| 1 | 94 |  | 80 | Fair | 0.45 | 0.80 | 36-80 |
| 2 | 77 |  | 20 | Poor | 0.20 | 1.00 | 81-00 |
| 3 | 4) |  | 15 |  |  |  |  |
| 4 | 45 |  | 88 |  |  |  |  |
| 5 | 43 |  | 98 |  |  |  |  |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Du | Random |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Digitis fo <br> Type of <br> Newsidy | Type of Nevsclay | Random <br> Digitis for <br> Demmand | Cumulative Random-Digit <br> Typeof Newsday Probability Probability Assigmment |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  | Good | 0.35 | 0.35 | 01-35 |
| 1 | 94 | Poor | 80 | Fair | 0.45 | 0.80 | 36-80 |
| 2 | 77 | Fiit | $21)$ | Poor | 0.20 | 1.00 | 81-00 |
| 3 | 4) | Firir | 15 |  |  |  |  |
| 4 | 45 | Fair | 88 |  |  |  |  |
| ; | 43 | Firl | 98 |  |  |  |  |

## The Newspaper Seller (7/8)

## Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

|  | Rundoun |  |  |  | Cumulative DistributionRandom-Digit Assigmment |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Typeof | Typeof | Digitis or |  | Dema | Goor | ood Fir | Fiir Po | Poor | Good Fair | Poor |
| Day | Nersiday | Nevssday | Demmand | Demmand | 40 | 0.03 | 130.1 | . 10 0.4 | 0.44 0 | 01-03 01-10 | 01-44 |
| 1 | 14 | Poot | 80 |  | 50 | 0.0 | 908 0.2 | 280.6 | 0.66 | 04-08 11-28 | 45-66 |
| 2 | 77 | Fair | 20 |  | 60 | 0.2 | 230.0 | 680.8 | 0.82 | 09-23 29-68 | 67-82 |
| 3 | $4)$ | Fair | 15 |  | 70 | 0.4 | 130.8 | . 880.4 | 0.942 | 24-43 69-88 | 83-94 |
| 4 | 45 | Fair | 88 |  | 80 | 0.1 | 780.5 | . 961. | 1.00 | 44-78 89-96 | 95-00 |
| 5 | 43 | Fair |  |  | 90 | 0.9 | 131. | .00 1.10 | 1.00 | 79-93 97-00 |  |
|  |  |  |  |  | 100 | 1.0 | 100 1.0 | . 001.10 |  |  |  |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$


## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$


## The Newspaper Seller (7/8)

## Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$


## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Da | Rention <br> Digitisfor <br> Type of <br> Nevslat | Type of <br> Newsiay | Rundom <br> Digits or <br> Denmend | Demmand | Cumulative DistributionRandom-Digit Assignment |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  | Demand Good Firir Poor Good | Fair | Poor |
|  |  |  |  |  | 40 0.03 0.10 0.44 01 <br> 50 0.08 0.28 0.66 $04-010$ | 01-10 | 01-44 |
| 1 | 14 | Poor | 80 | 60 |  | 11-28 | 45-66 |
| 2 | 77 | Fair |  |  | $\begin{array}{lllllll}\text { 60 } & 0.23 & 0.68 & 0.82 & 09-23\end{array}$ | 29-68 | 67-82 |
| 3 | $4)$ | Fair | 1.5 |  | $70 \quad 0.430 .8880 .94$ | 69-88 | 83-94 |
| 4 | 45 | Fair | 88 |  | 80 | 89-96 | 95-00 |
| j | 43 | Fair | 98 |  | $90 \quad 0.931 .00$ |  |  |
|  |  |  |  |  | $100 \begin{array}{lllll}1.00 & 1.00 & 1.00 & 94-00\end{array}$ |  |  |

## The Newspaper Seller (7/8)

## Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$


## The Newspaper Seller (7/8)

## Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Day | Random <br> Digits or <br> Type of <br> Newslay | Type of <br> Nevsslay | Rundom <br> Digits for <br> Demennd | Demmand | Reverilue <br> from <br> Sales | Losis Projil <br> from Excess <br> Demend | Salvuge <br> from Sale <br> of Scriop | Daily <br> Profit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 14 | Poot | 80 | 60 |  |  |  |  |
| 2 | 77 | Fair | 21) | 50 |  |  |  |  |
| 3 | 49 | Fiir | 15 | 50 |  |  |  |  |
| 4 | 45 | Fair | 88 | 70 |  |  |  |  |
| $j$ | 43 | Fair | 98 | 90 |  |  |  |  |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Day | Rumbun |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Digisfor |  | Rambom |  | Reveme Lost Prup | Saduge |  |
|  | Tipeof | Typeof | Digisfor |  | from from Exeess | from Sde | Daily |
|  | Nesesily | Nevsilay | Demand | Demmand | Sides Demmand | of Scrup | Profit |
| 1 | 4 | Por | 80 | 60 | (30.00) | \$90.5) | \$7.40 |
| 2 | 7 | Fiir | 20 | 50 | - |  |  |
| 3 | 49 | Fiir | 15 | 50 | $\cdots$ |  |  |
| 4 | 45 | Fir | 88 | 70 | 60*(50 cents) | \$30.00 |  |
| ; | 43 | Fir | 88 | 9 |  |  |  |

## The Newspaper Seller (7/8)

## Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

|  | Rundom |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Dipitis or |  | Random |  | Reventue | Losi Profil | Saluge |  |
|  | Typeof | Type of | Dipits for |  | frown | from Exeess | from Sile | Daily |
| Day | Nersidy | Nersslay | Demmand | Demmand | Soles | Demuand | of Screion | Profif |
| 1 | 14 | Poot | 80 | 60 | \$30,00 | - | (91.50) | \$7.40 |
| 2 | 77 | Fiir | 20 | 50 |  |  |  |  |
| 3 | 4) | Fiil | 15 | 50 |  |  |  |  |
| 4 | 45 | Fair | 88 | 70 | $10 *$ ( | cents) | \$0.50 |  |
| 5 | 43 | Fair | 98 | 90 |  |  |  |  |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$


## The Newspaper Seller (7/8)

## Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Day | Rinnlom <br> Digitis for <br> Type of <br> Newsday | Type of <br> Nevslay | Rundom <br> Digits for <br> Denmand | Demmand | Reventue <br> from Sales | Loss Profic <br> from Excess <br> Demand | Salvage <br> from Sile <br> of Scrien | Didly <br> Profit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 14 | Poor | 80 | 60 | 830.00 | - | 80.50 | \$7.40 |
| 2 | 77 | Fair | 20 | 50 | 25.00 | - | 1.00 | 200 |
| 3 | 49 | Fair | 15 | 50 |  |  |  |  |
| 4 | 45 | Firl | 88 | 70 |  |  |  |  |
| 5 | 43 | Fair | 98 | 90 |  |  |  |  |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Day | Rumbom |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Dipisfor |  | Rumbom |  | Reverue Lostrour |  | Saluex |  |
|  | Ipeof | Tpeot | Digits or |  | from | froum Erees | from Slie | Daily |
|  | Nersslay | Nevsrlay | Demand | Demmand | Sdes | Demmand | ${ }_{\text {d. Scrup }}$ | Profir |
| 1 | 4 | Poor | 80 | 60 | 83010 |  | \$(1).50 | 57.40 |
| 2 | 7 | Fiir | 20 | 50 | . |  | 1.00 | 200 |
| 3 | 49 | Fiir | 15 | J |  |  |  |  |
| 4 | 45 | Fiir | 88 | 70 |  |  |  |  |
| 5 | 43 | Fir | 48 | 90 | 50* | cents) | \$25.0 |  |

## The Newspaper Seller (7/8)

## Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Day | Random |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Digits for |  | Rundom |  | Revenlue | Losis Profil | Salvage |  |
|  | Type of | Type of | Digits or |  | from | from Excess | from Side | Daily |
|  | Nersslay | Newsily | Demmand | Demmand | Siles | Demund | of Scrup | Profic |
| 1 | 14 | Poor | 80 | 60 | \$30.00 | - | 80.50 | $\$ 7.4$ |
| 2 | 77 | Fiit | 210 | 50 | 25.10 | - | (1.00) | 29 |
| 3 | 4) | Fiir | 15 | 50 |  |  |  |  |
| 4 | 45 | Fiir | 88 | 70 |  |  |  |  |
| j | 43 | Fair | 98 | 90 | $20^{*}$ | cents) | \$1.00 |  |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$


## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Rundom |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Da) | Digits or |  | Rundom |  | Revenilue | Losi Profil | Saluge |  |
|  | Type of | Type of | Digits for |  | fromb | from Exiess | from Sale | Didy |
|  | Newsily | Nevsilay | Demand | Demmand | Sales | Demmand | of Scrup | Profit |
| 1 | 14 | Poot | 80 | 60 | \$30.00 | - | \$10.50 | \$7.40 |
| 2 | 77 | Fair | 20 | 50 | 25.00 | - | 1.00 | 200 |
| 3 | 49 | Fair | 15 | 50 | 25.00 | - | 1.00 | 2.90 |
| 4 | 45 | Fiir | 88 | 70 | 35.00 | - | - | 11.80 |
| 5 | 43 | Fiir | 18 | 90 |  |  |  |  |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$


## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$


## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Day | Random <br> Digits for <br> Type of <br> Newsidy | Type of <br> Nevsclay | Random <br> Digits for <br> Demmend | Demmand | Reventule <br> from <br> Sides | Losis Projil <br> from Execess <br> Demend | Salvace <br> from Sale <br> of Scriap | $\begin{aligned} & \text { Duily } \\ & \text { Profii } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 14 | Poor | 80 | 60 | 830.00 | - | 80.50 | \$7.40 |
| 2 | 77 | Fair | 20 | 50 | 25.00 | - | 1.00 | 200 |
| 3 | $4{ }^{4}$ | Fair | 15 | 50 | 25.00 | - | 1.00 | 2.00 |
| 4 | 45 | Fair | 88 | 70 | 35.00 | - | - | 11.90 |
| $j$ | 43 | Fiir | 98 | 90 | 35.00 | \$3.40 | - | 8.50 |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Rumbom |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Day | Digisfor |  | Rumbom |  | Reveme | Lost Profic | Saluge |  |
|  | Tipeof | Tpeot | Digisfor |  | from | from Erees | from Sle | Dally |
|  | Nersslay | Nevsslay | Denumd | Demand | Sdes | Demand | $10^{1}$ Scrup | Profit |
| 1 | 14 | Poor | 81 | 60 | \$30,00 |  | \$10.50 | 59.40 |
| 2 | 7 | Firl | 20 | 50 | 20010 | - | 1 m | 2.00 |
| 3 | 49 | Firl | 15 | 5 | 70*(50 | cents) | \$35.00 |  |
| 4 | 45 | Fir | 88 |  |  | - | - | 11.50 |
| ; | 43 | Fiir | 8 |  |  | 83.40 | - | 8.00 |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Rumbom |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Day | Digisifor |  | Rambom |  | Reverule Losi Proin | Losp Profir | Saluege |  |
|  | Tipeof | Ippeof | Digisfor |  | from | from Exees | from Sile | Dialy |
|  | Nerslay | Nesslay | Demmand | Denmand | Sdes | Demend | of Scrup | Profit |
| 1 | 94 | Puor | 80 | 61 | \$30.00 | - | \$10.5) | \$7.40 |
| 2 | 71 | Fir | 20 | 50 | 2010 | - | 1 im | 2.00 |
| 3 | 49 | Firl | 15 | $5{ }^{5}$ | 20* | 7 cents) | = 3.4 | 2.0 |
| 4 | 45 | Fir | 88 |  |  |  | - | 11.50 |
| ; | 43 | Fir | 8 |  |  | (1) | - | 8.50 |

## The Newspaper Seller (7/8)

Simulation Table (70 newspapers, 5 days)
Cost of daily newspapers $=70 * 0.33=\$ 23.10$


## The Newspaper Seller (8/8)

Profit (1/5):

Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Randoin |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Dipits for |  | Rundom |  | Revenule | Losis Profil | Salvage |  |
|  | Type of | Type of | Digits for |  | from | from Exeess | from Sole | Daily |
| Day | Newsidy | Nevsslay | Demmand | Demmend | Sules | Demand | of Scriep | Profif |
| 1 | 94 | Poor | 80 | 60 | 830.00 | - | \$0.50 | $\$ 7.40$ |

On day 1 the demand is for 60 newspapers. The revenue from the sale of 60 newspapers is $\$ 30.00$. Ten newspapers are left over at the end of the day. The salvage value at 5 cents each is 50 cents.

## The Newspaper Seller (8/8)

Profit (2/5):

Cost of daily newspapers
$=70 * 0.33=\$ 23.10$

$$
\begin{aligned}
\text { Profit }= & \binom{\text { revenue }}{\text { from sales }}-\binom{\text { cost of }}{\text { newspapers }} \\
& \quad-\binom{\text { lost profit from }}{\text { excess demand }}+\binom{\text { salvage from sale }}{\text { of scrap papers }}
\end{aligned}
$$

On day 1 the demand is for 60 newspapers. The revenue from the sale of 60 newspapers is $\$ 30.00$. Ten newspapers are left over at the end of the day. The salvage value at 5 cents each is 50 cents. The profit for the first day is determined as follows:

$$
\text { Profit }(\text { Day\#1) }=30.00-23.10-0+0.50=\$ 7.40
$$

## The Newspaper Seller (8/8)

Profit (3/5):
Cost of daily newspapers $=70 * 0.33=\$ 23.10$

| Rundom |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Day | Digitis or |  | Random |  | Revenue | Loss Profit | Saluage |  |
|  | Type of | Type of | Digits for |  | from | from Excess | from Sale | Daily |
|  | Newsidy | Newsilay | Demmand | Demmand | Sales | Demmand | of Scrap | Profit |
| 5 | 43 | Fair | 98 | 90 | 35.00 | \$3.40 | - | 8.50 |

On the fifth day the demand is greater than the supply. The revenue from sales is $\$ 35.00$, since only 70 papers are available under this policy. An additional 20 papers could have been sold. Thus, a lost profit of $\$ 3.40(20 \times 17$ cents $)$ is assessed.

## The Newspaper Seller (8/8)

Profit (4/5):

Cost of daily newspapers
$=70 * 0.33=\$ 23.10$

$$
\begin{aligned}
\text { Profit }= & \binom{\text { revenue }}{\text { from sales }}-\binom{\text { cost of }}{\text { newspapers }} \\
& -\binom{\text { lost profit from }}{\text { excess demand }}+\binom{\text { salvage from sale }}{\text { of scrap papers }}
\end{aligned}
$$

On the fifth day the demand is greater than the supply. The revenue from sales is $\$ 35.00$, since only 70 papers are available under this policy. An additional 20 papers could have been sold. Thus, a lost profit of $\$ 3.40(20 \times 17$ cents $)$ is assessed.

$$
\text { Profit }(\text { Day\#5 })=35.00-23.10-3.40+0=\$ 8.50
$$

## The Newspaper Seller (8/8)

Profit (5/5):
Cost of 20 days newspapers

$$
=70 * 0.33^{*} 20=\$ 462
$$

| Rundom |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Day | Digits or |  | Rundom |  | Revenue | Loss Profit | Salvage |  |
|  | Typeof | Typeof | Digitis or |  | from | from Exeess | from Sale | Daily |
|  | Newsidy | Newsiday | Denand | Demmand | Sales | Demmand | of Scrup | Profit |
| 20 | 78 | Fair | $\%$ | 80 | 35.00 | 1.70 | - | 10.20 |
|  |  |  |  |  | \$645.00 | \$13.60 | \$5.50 | \$174.90 |

The profit for the 20 -day period is the sum of the daily profits, $\$ 174.90$. It can also be computed from the totals for the 20 days of the simulation as follows:

$$
\begin{aligned}
\text { Total profit } & =\$ 645.00-\$ 462.00-\$ 13.60+\$ 5.50 \\
& =\$ 174.90
\end{aligned}
$$

## YOUR TURN

## You can do the following, and not only:

1. Repeat the simulations many times and take the average of the total profits.
2. Change the number of purchased Newspapers, then repeat the simulation.
3. Draw a graph to show the relation between the number of purchased Newspapers and the total profits.
4. ...

## Video Lectures

All Lectures: https://www.youtube.com/playlist?list=PLx|vc-MEDsBgeFJmdvDIIN5zE89-Hq政

Lecture \#Б: https://www.youtube.com/watch?v=GUYLkzvBnCDCOlist=PLx|vc-


## Thank You

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ahagag@fci.bu.edu.eg

