Cairo University

Faculty of Computers and artificial intelligence

Department: Operations Research and Decision Support

Course Name: Systems Modeling and Simulation

Course Code: DS331 / DS241

Instructor: Assoc. Prof. Ayman Ghoneim

Report Documentation

For Problem II

[Car Dealer]

BY:

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Contents

Problem formulation & Objectives.

Formulation:

A Car dealer has 2 places the first one is the show room (for customers to closely inspect the car and its options) that can hold a maximum of 5 cars, And the other on which is the inventory holds a maximum of 10 cars.

When there is a demand, the cars sell from the inventory first then from the show room.

the car dealer shipping and order every 3 days and the order arrives in “lead time” days and the cost of shipping is 20,000, and the profit selling of a car is 10,000 and if there is a cars remimning is the places each car cost 1000 finally if the demand is more than the cars this is determined as loos.

Objectives:

-To Calculate whether these prices will lead to a profitable gain or not.

-To see if the data needs to be adjusted to try to reach the most net profit.

System Components.

Entity: Car .
Attribute: Showroom , Inventory .
Activity: Demand .
State: Number of cars .
Event : Shipping order .

System Analysis.

Calendar table:

Day	Starting showroom cars	Starting inventory cars	Demand	Showroom after demand	Inventory after demand	Showroom shortage	Inventory shortage	Lead Time	Order day	Order quantity	IS shortage	Net profit
1	4	3	0	4	3	1	7	NONE	NONE	8	No	-7000
2	4	3	3	4	0	1	10	NONE	NONE	11	No	26000
3	4	0	1	3	0	2	10	2	5	12	No	7000
4	3	0	0	3	0	2	10	NONE	NONE	12	No	-3000
5	5	10	1	5	9	0	1	NONE	NONE	1	No	-24000
6	5	9	1	5	8	0	2	1	7	2	No	-3000

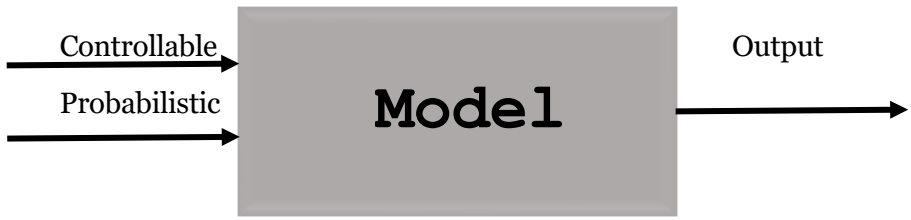
7	5	10	2	5	8	0	2	NONE	NONE	2	No	-13000
8	5	8	1	5	7	0	3	NONE	NONE	3	No	-2000
9	5	7	2	5	5	0	5	2	11	5	No	10000
10	5	5	0	5	5	0	5	NONE	NONE	5	No	-10000

Cumulative distribution tables:

Demand	
Cumulative Distribution	**Time**
0.2	**0**
0.45	**1**
0.9	**2**
0.9	**3**

Lead Time	
Cumulative Distribution	**Time**
0.4	**1**
0.75	**2**
1	**3**

Experimental Design Parameters:



Controllable inputs:

- Number of cars in showroom
- Number of cars in inventory

Probabilistic inputs:

- Demand.
- Lead time.

Justification of experiment parameters values

Controllable inputs:

- Number of cars in showroom = 4.
- Number of cars in inventory = 3.

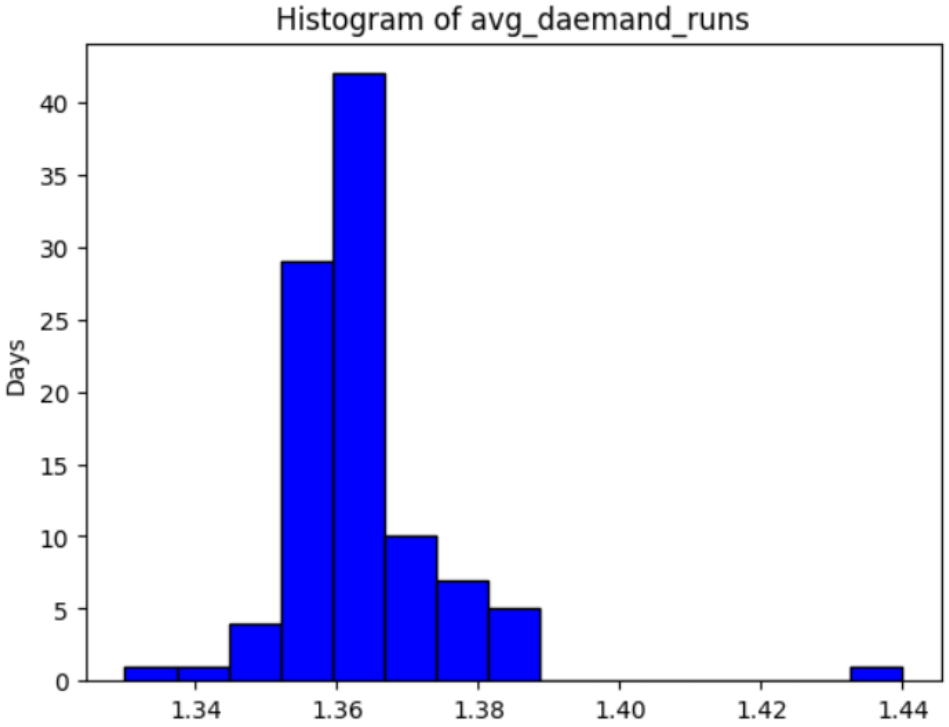
Probabilistic inputs:

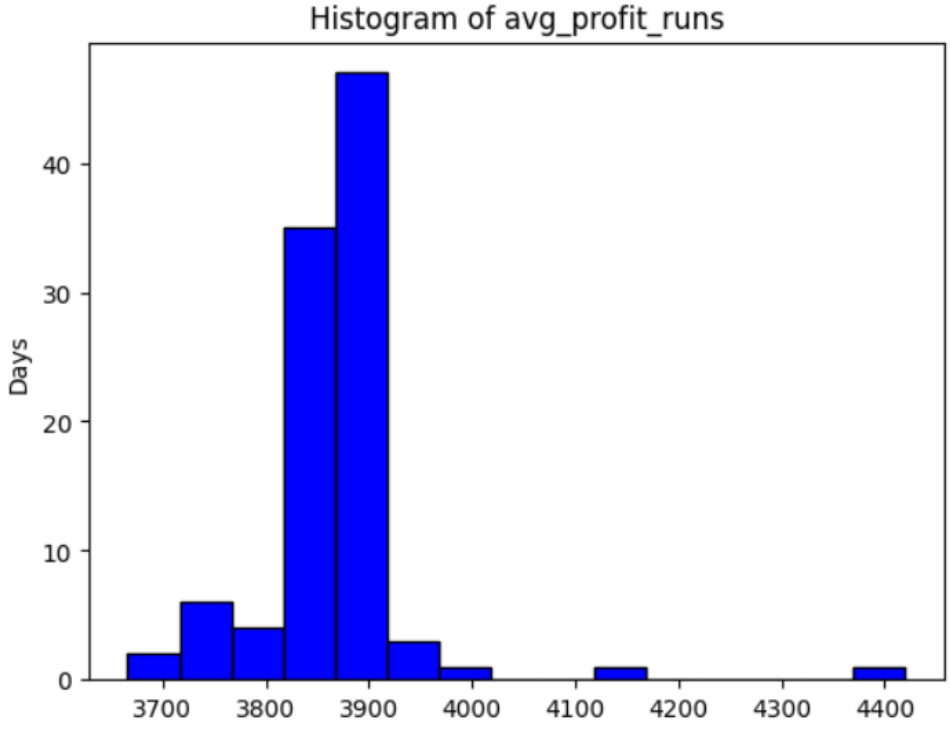
- Demand generated randomly every day .
- Lead time generated randomly when an order is placed.

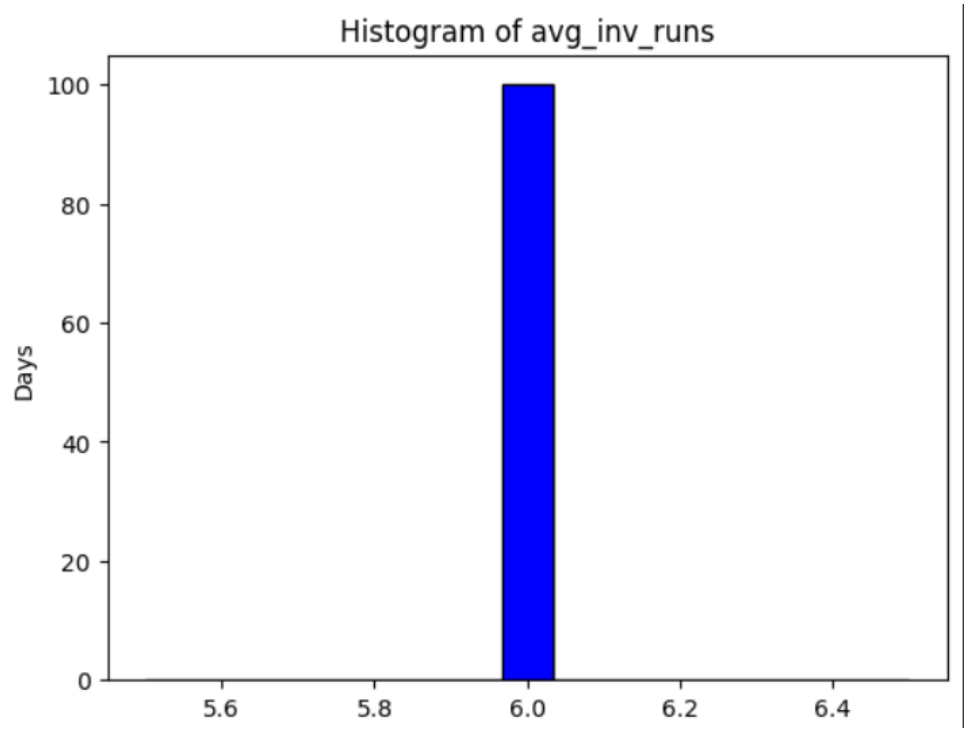
Result Analysis

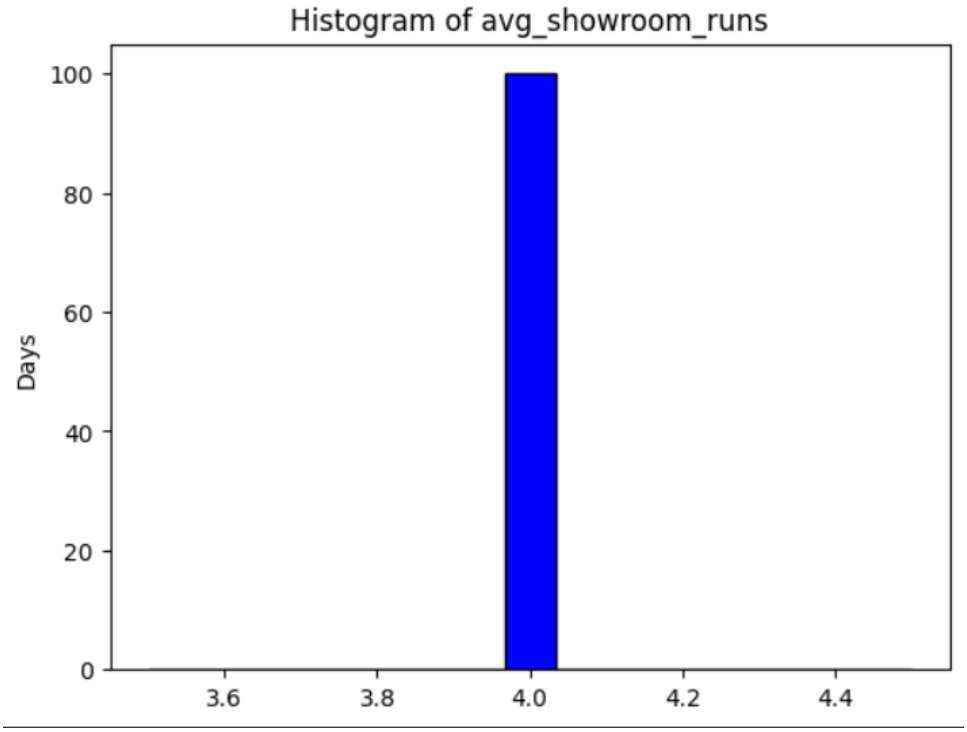
Test case1:

Number of days small = 50
Number of repeating is 100






Histogram of avg_inv_runs
Days
100
80
60
40
20
0
5.6
5.8
6.0
6.2
6.4


Histogram of avg_showroom_runs
Days
100
80
60
40
20
0
3.6
3.8
4.0
4.2
4.4

Output ‘Average of Average’:

---

avg profits: 3869.0917581562035

showroom average: 4.0

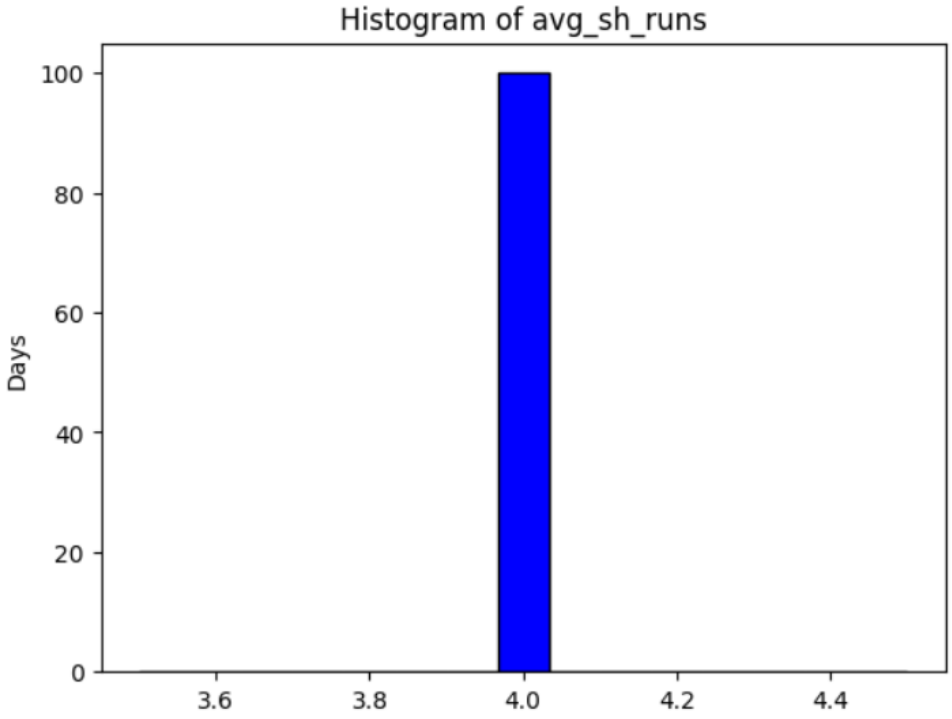
inventory average: 6.0

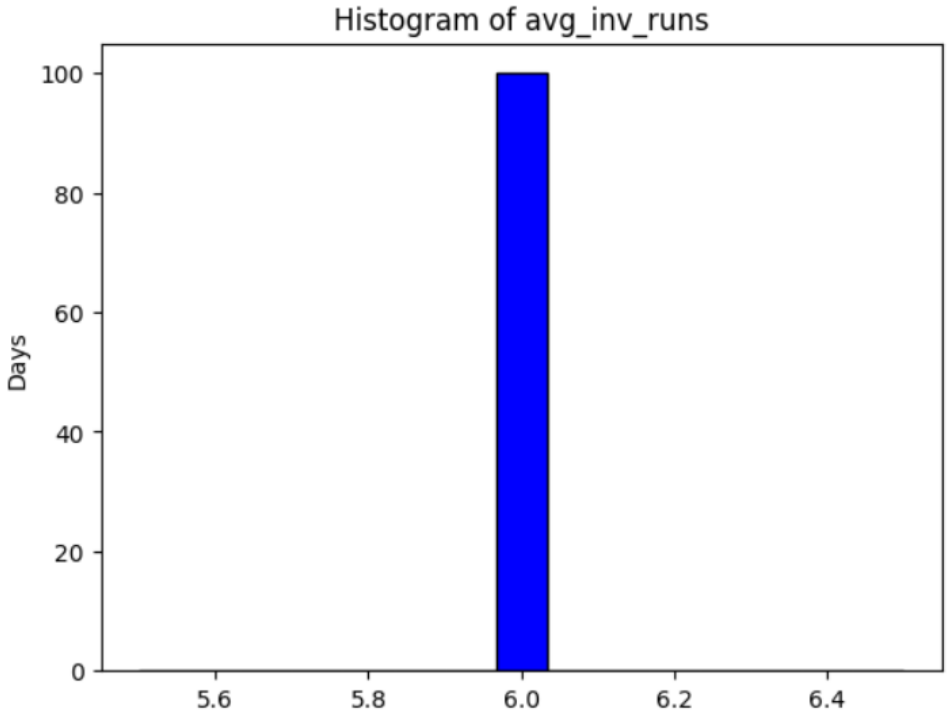
demand average: 1.363572344144559

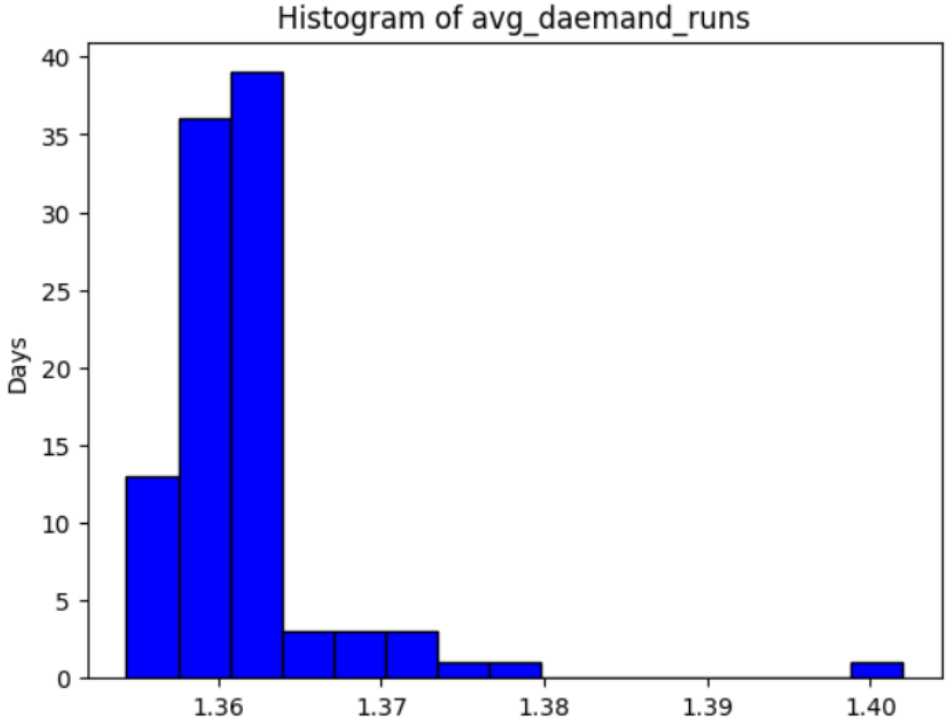
Test case2:

Number of days medium= 500

Number of repeating is 100




Histogram of avg_inv_runs
Days
100
80
60
40
20
0
5.6
5.8
6.0
6.2
6.4


Histogram of avg_daemand_runs
Days
40
35
30
25
20
15
10
5
0
1.36
1.37
1.38
1.39
1.40

Output 'Average of Average':

---

avg profits: 3726.0071483795136

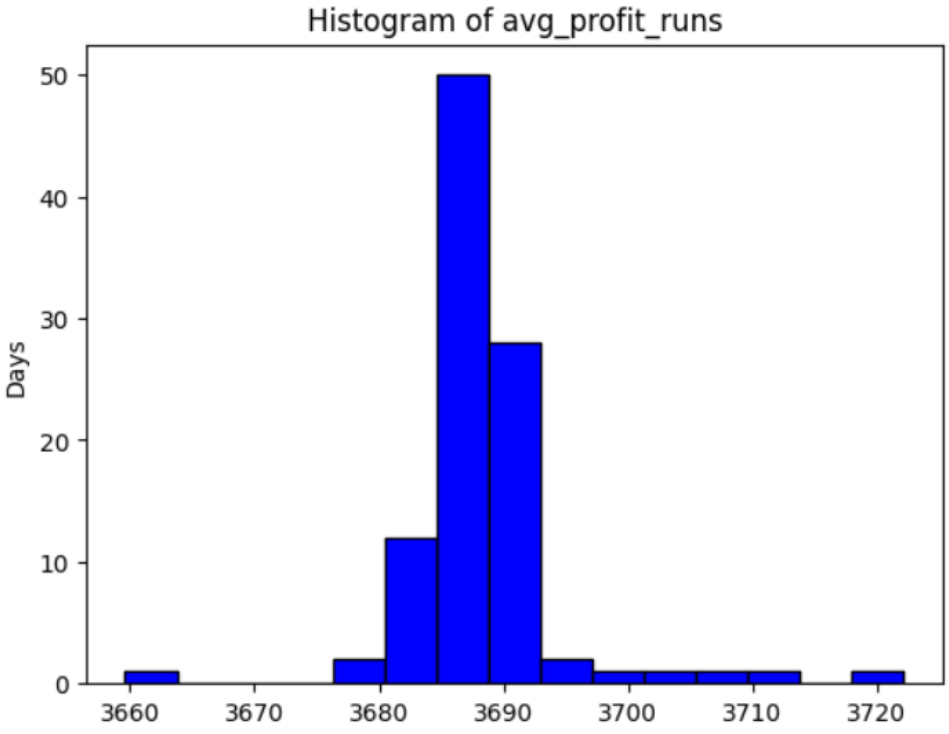
showroom average: 4.0

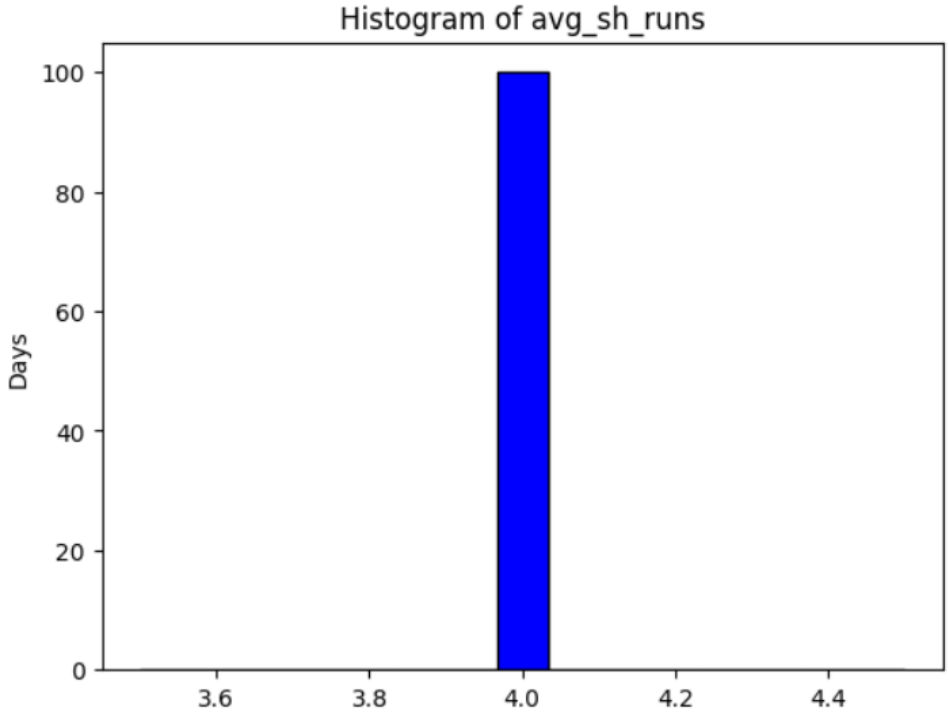
inventory average: 6.0

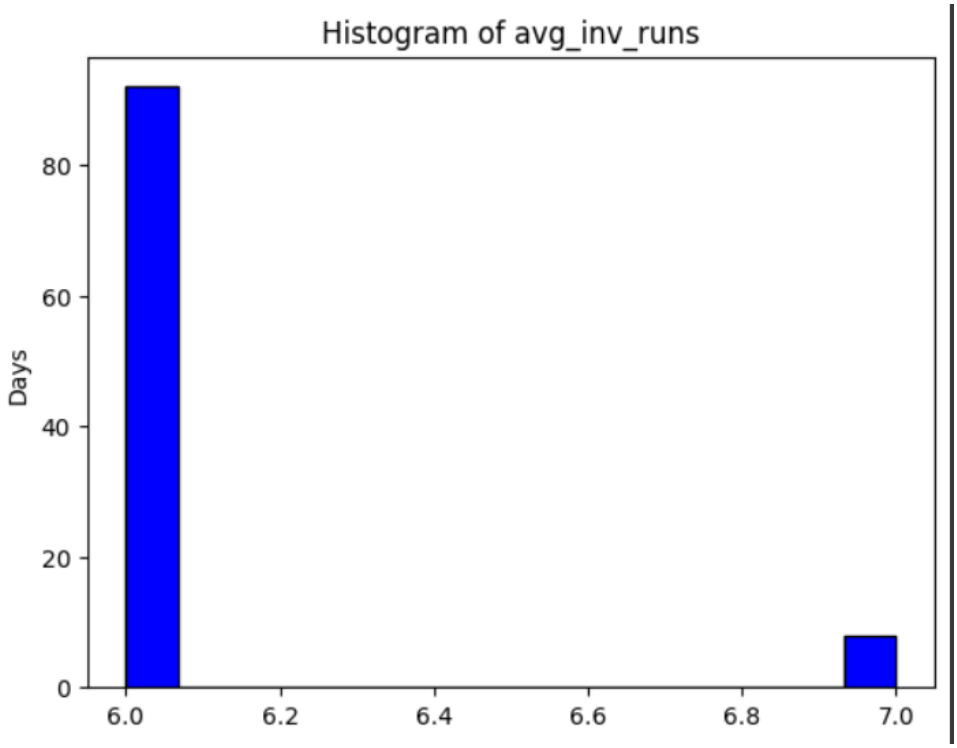
demand average: 1.3614470627090518

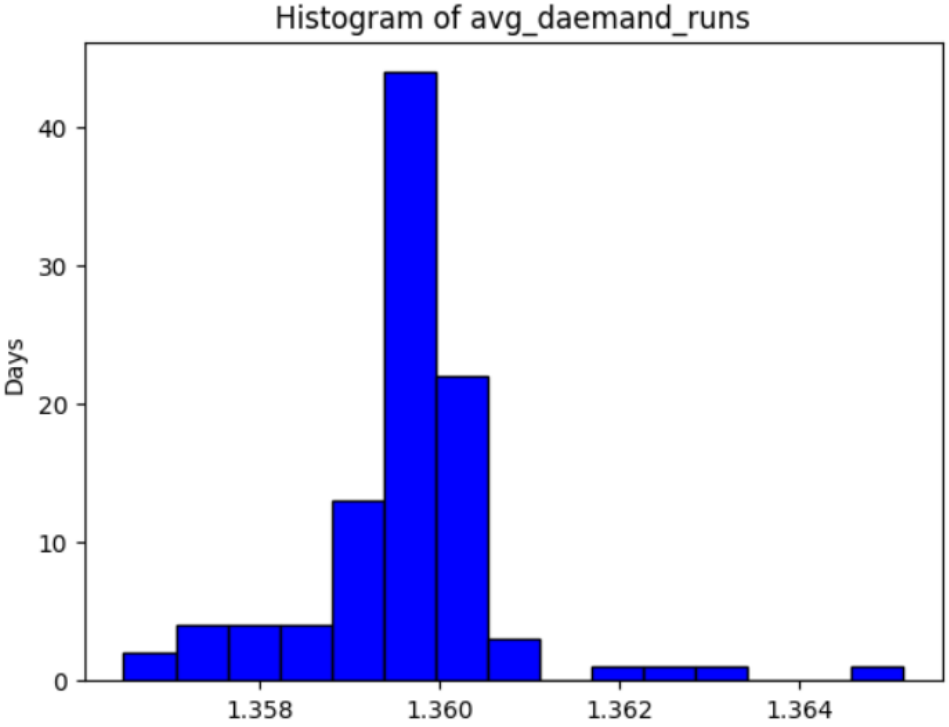
Test case3:

Number of days medium= 10000
Number of repeating is 100






Histogram of avg_inv_runs
Days
0
20
40
60
80
6.0
6.2
6.4
6.6
6.8
7.0


Histogram of avg_daemand_runs
Days
0
10
20
30
40
1.358
1.360
1.362
1.364

Output 'Average of Average':

---

avg profits: 3688.1431041689725

showroom average: 4.0

inventory average: 6.08

demand average: 1.3596324339328492

Conclusion

He should extend the review period of the order, to increase profits because for each shipment it costs 2000.