

# chapter 6

Quiz Simulation Prof M. Barghash IE SoE UoJ

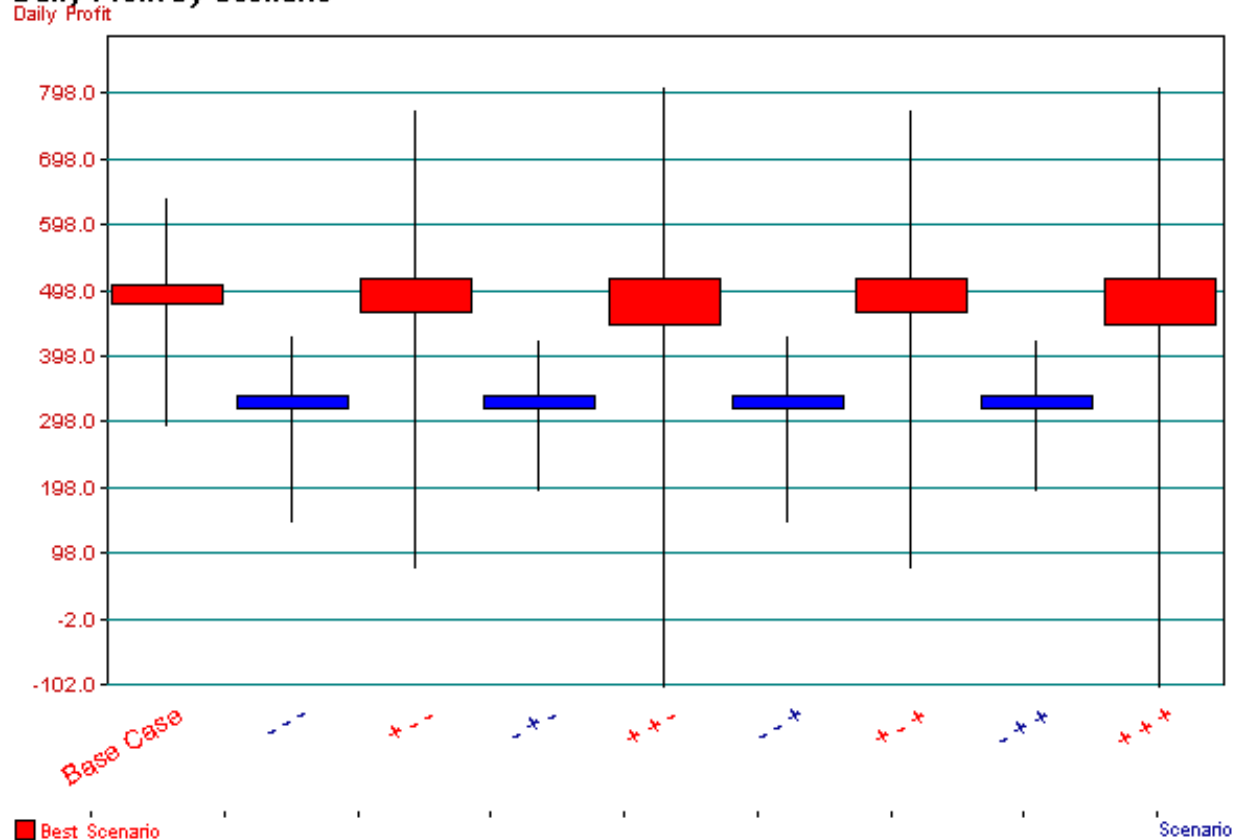
22/5/2025

Name:

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Describe using PAN in arena how to prepare such a chart (start with the model doe file, run it then on the PAN then ..... your answer)

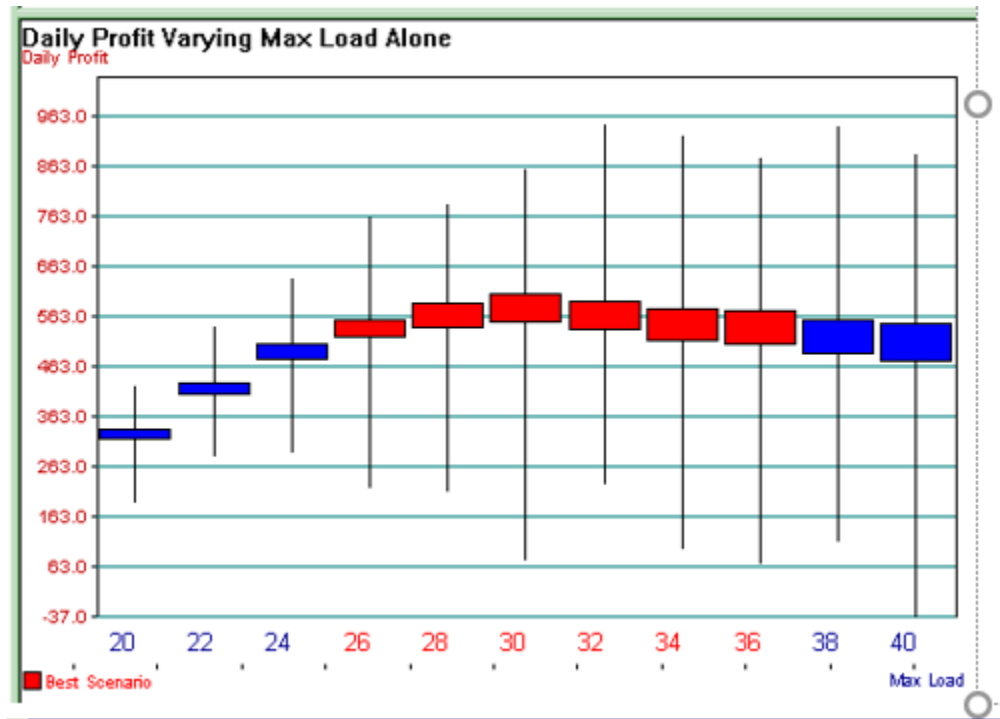
**Daily Profit by Scenario**



Name:

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Describe using PAN in arena how to prepare such a chart (start with the model doe file, run it then on the PAN then ..... your answer)

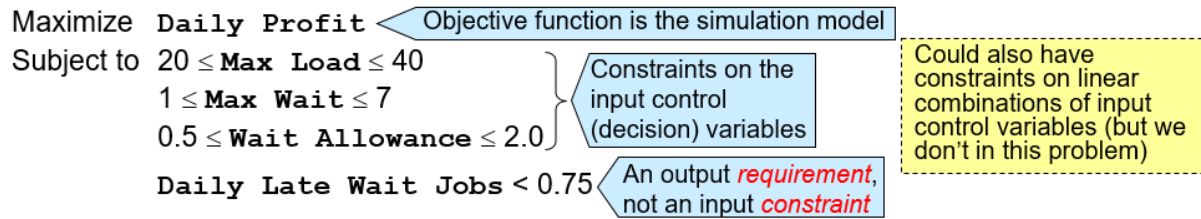


# chapter 6

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Describe using OPTQUEST in arena how to implement this optimization problem

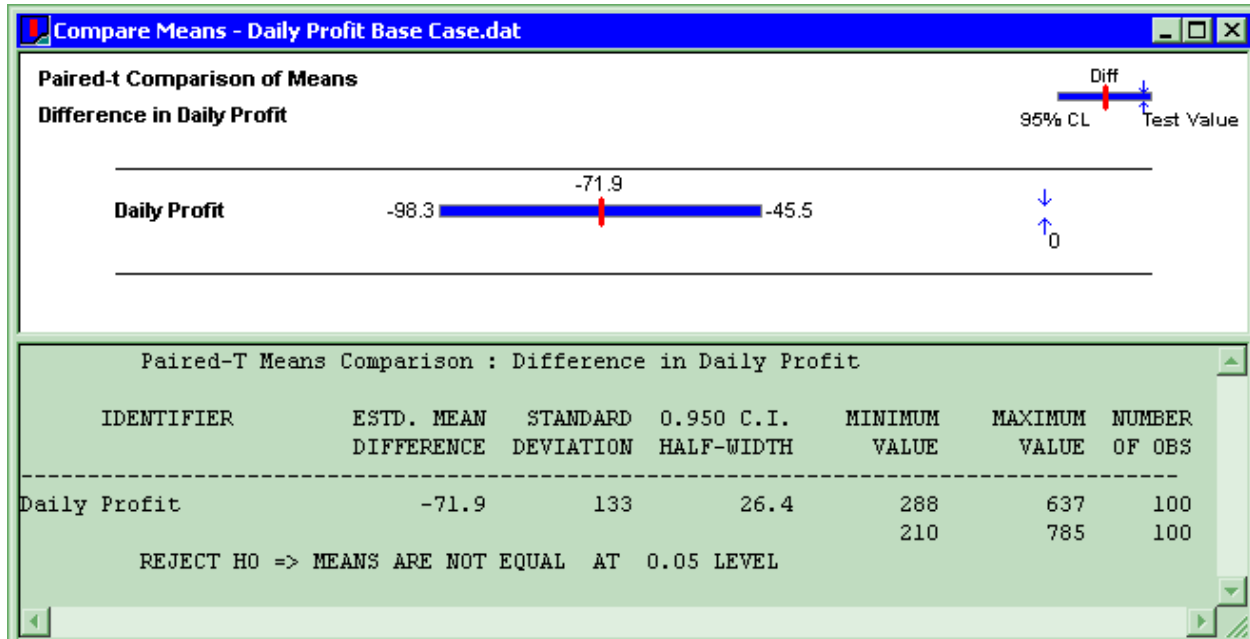


# chapter 6

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Describe using output analyzer in arena how to make this alternative comparison



# chapter 6

Write the model for simulating a transporter system in a manufacturing facility using Arena Simulation Software. The system consists of three workstations: A, B, and C. Parts arrive at Workstation A every 10 minutes on average (exponentially distributed), where they undergo processing with a time of  $\text{tria}(2, 3, 4)$  minutes. After processing, parts are transported by one of two available transporters to either Workstation B or Workstation C based on part type (50% to each station).

Each workstation processes parts with the same time:

Workstation B :  $\text{tria}(2, 3, 4)$  minutes

Workstation C :  $\text{tria}(2, 3, 4)$  minutes

Each transporter moves at a speed of 3 meters per second. The distances between stations are as follows:

A to B: 60 meters

A to C: 45 meters

B to Inspection: 75 meters

C to Inspection: 50 meters

After processing at B or C, all parts return to a central inspection area where final quality checks are also performed using the same processing time:  $\text{tria}(2, 3, 4)$ .

# chapter 7 / 8

Write the model for simulating a conveyor-based material handling system in a distribution center using Arena Simulation Software. The conveyor system starts at an entry point where parts arrive randomly (every 6 minutes on average, exponentially distributed). Upon arrival, parts are placed on a main conveyor loop that transports them to one of three sorting stations: S1, S2, or S3, based on their destination code (assigned randomly: 30% S1, 50% S2, 20% S3).

All sorting operations use the same processing time:  $\text{tria}(2, 3, 4)$  minutes.

The conveyor is 60 meters long and moves at a constant speed of 0.5 m/s

After sorting, parts exit the system

# chapter 7 / 8

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Boxes arrive to a warehouse every EXPO(10) minutes. Each box must be transported to one of four storage zones selected randomly. There are two forklifts that move the boxes; travel time between locations is based on a distance matrix provided below. Forklifts return empty after each delivery. Simulate for 8 hours

From To	arrive	St1	St2	St3	St4
Arrive	0	2	3	4	5
St1	1	0	3	4	5
St2	1	2	0	4	5
St3	1	2	3	0	5
St4	1	2	3	4	0

# chapter 7 / 8

Patients arrive at a hospital every  $\text{EXPO}(15)$  minutes. After registration, they are transported by a porter to either radiology, lab, or consultation rooms. There are three porters who use predefined distances between stations (see table). Porters can carry only one patient at a time and return empty after each trip. Simulate for 10 hours and collect:

All distances are 5, processing times  $\text{expo}(7)$ , patients leave directly after any operation

# chapter 7 / 8



Name ID

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Parts arrive every EXPO(6) minutes to a production line with three machines connected by non-accumulating conveyors . The conveyor speed is 12 ft/sec, and the distance between each station is 30 ft. Processing times are:

Machine 1: TRIA(2, 4, 6) minutes

Machine 2: EXPO(5) minutes

Machine 3: UNIF(3, 7) minutes

Each machine has a buffer space of 4 parts.

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In a packaging facility, products arrive every EXPO(5) minutes and are placed onto an accumulating conveyor that feeds three packing stations. Products wait on the conveyor until a station becomes available. Packing times are TRIA(3, 5, 8) minutes at each station. The conveyor can hold up to 20 items ( this is related to the length of the conveyor, example 20, and the product needs one unit) . Simulate for 10 hours. Part leaves after packaging. Simulate using arena

# chapter 7 / 8

Quiz Simulation Prof M. Barghash modelling IE SoE UoJ 3/6/2025  
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Evaluate the first 3 random numbers  $R_1, R_2, R_3$  using linear congruential method if  $X_0 = 10$ ,  
 $M=103$ ,  $a=13$   $c=17$

# random number generation

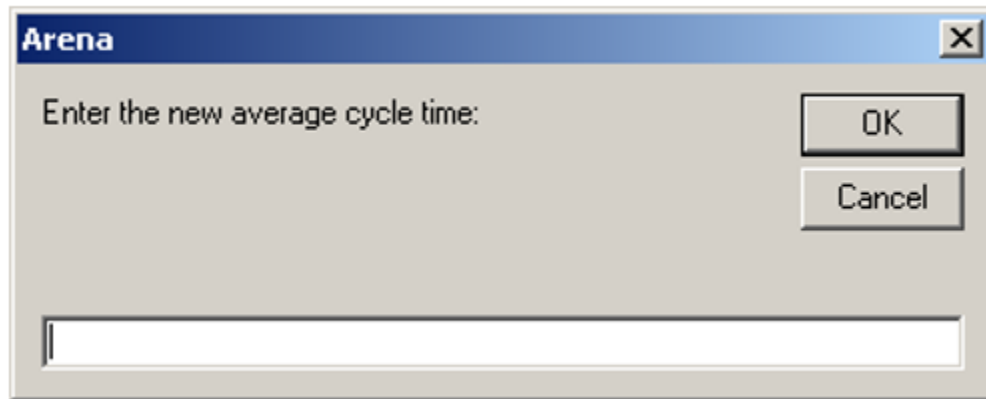
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If the first 3 random numbers are R1: 0.1007, 0.9003, 0.21 R2: 0.5731, 0.3412, 0.7771  
generate the first 3 standard normal numbers, then generate the first  
 $n(7,1)=\sigma*Z+\text{mean}=1*Z+7$ .

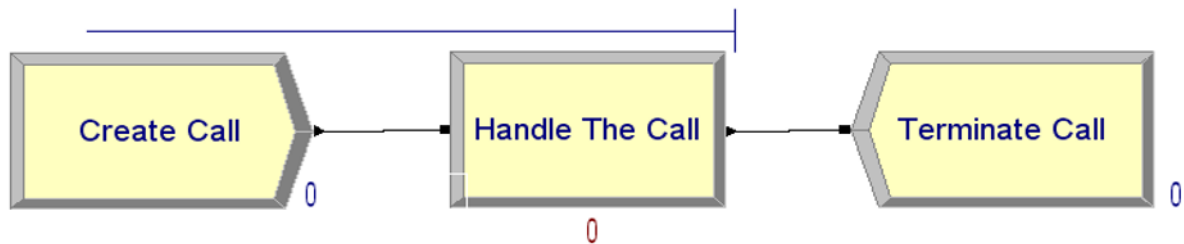
# random variate generation

Write the VBA code to read the variable cycle time when the reaches vba block , by first make the following message box to appear



# chapter 10

For the arena model



Explain how the arrival can be generate according to the following arrival in excel sheet

	A	B
1	1.038457	
2	2.37412	
3	4.749443	
4	9.899661	
5	10.525897	
6	17.09886	
7	17.153128	
8	21.618161	

# chapter 10