

Q1 a)

Spreadsheet Implementation:

The screenshot shows a Microsoft Excel spreadsheet titled "Sheet1" and the "Solver Options and Model Specification" dialog box.

Spreadsheet Data (Sheet1):

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2		#Rooms	100										
3		Rent	\$150										
4		Vcost	\$30										
5		Prob No Show	0.05										
6		Compensation	\$200										
7		# no show	5										
8													
9													
10		Rooms Demanded	100										
11		Rooms Availed	93										
12													
13													
14		Revenue	\$15,000										
15		Total Cost Compensation	\$0										
16		Total VC	\$2,790										
17		Marginal Profit	\$12,210										
18													
19		Average Profit	12150.06										
20		Error Bar	4.066469066										
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Solver Options and Model Specification Dialog Box:

- Optimization Model:**
 - Optimizations to Run: 1
 - Run Specific Optimizer
 - Interpreter: Automatic
 - Solve Mode: Solve Complete Problem
 - Solve Uncertain Models: Automatic
 - Use Psi Functions to Do...: False
 - Use Interactive Optimiz...: False
- Simulation Model:**
 - Simulations to Run: 1
 - Run Specific Simulation
 - Trials per Simulation: 1000
 - Interpreter: Automatic
 - Use Correlations: True
 - Value to Display: All Trials
 - Trial to Display: 1
 - Number of Threads: 0
- Decision Tree:**
 - Certainty Equivalents: Expected Values
 - Decision Node EV/CE: Maximize
 - Risk Tolerance: 1E+12
 - Scalar A: 1.0
 - Scalar B: 1.0
- Diagnosis:**
 - Intended Model Type: Nonlinear
 - Intended Use of Uncer...: No Uncertainties

(Name) Simulation finished successfully.

Q1 b)

The Hotel should accept 105 reservations if it wants to maximize average daily profit as compared to other simulations using 100,110,115 reservations

The screenshot shows a Microsoft Excel spreadsheet titled "Sheet1" and the "Solver Options and Model Specification" dialog box.

Spreadsheet Data (Sheet1):

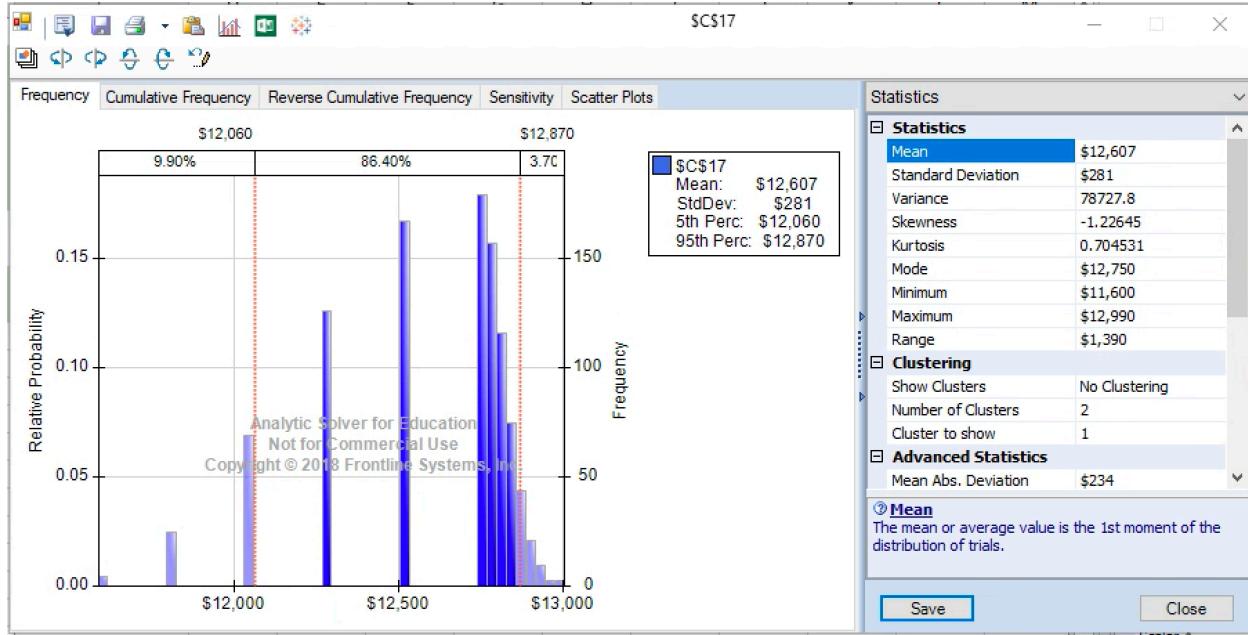
	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2		#Rooms	100										
3		Rent	\$150										
4		Vcost	\$30										
5		Prob No Show	0.05										
6		Compensation	\$200										
7		# no show	5										
8													
9													
10		Rooms Demanded	105										
11		Rooms Availed	98										
12													
13													
14		Revenue	\$15,750										
15		Total Cost Compensation	\$0										
16		Total VC	\$2,940										
17		Marginal Profit	\$12,810										
18													
19		Average Profit	12607.24										
20		Error Bar	17.3893755										
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Solver Options and Model Specification Dialog Box:

- Optimization Model:**
 - Optimizations to Run: 1
 - Run Specific Optimizer
 - Interpreter: Automatic
 - Solve Mode: Solve Complete Problem
 - Solve Uncertain Models: Automatic
 - Use Psi Functions to Do...: False
 - Use Interactive Optimiz...: False
- Simulation Model:**
 - Simulations to Run: 1
 - Run Specific Simulation
 - Trials per Simulation: 1000
 - Interpreter: Automatic
 - Use Correlations: True
 - Value to Display: All Trials
 - Trial to Display: 1
 - Number of Threads: 0
- Decision Tree:**
 - Certainty Equivalents: Expected Values
 - Decision Node EV/CE: Maximize
 - Risk Tolerance: 1E+12
 - Scalar A: 1.0
 - Scalar B: 1.0
- Diagnosis:**
 - Intended Model Type: Nonlinear
 - Intended Use of Uncer...: No Uncertainties

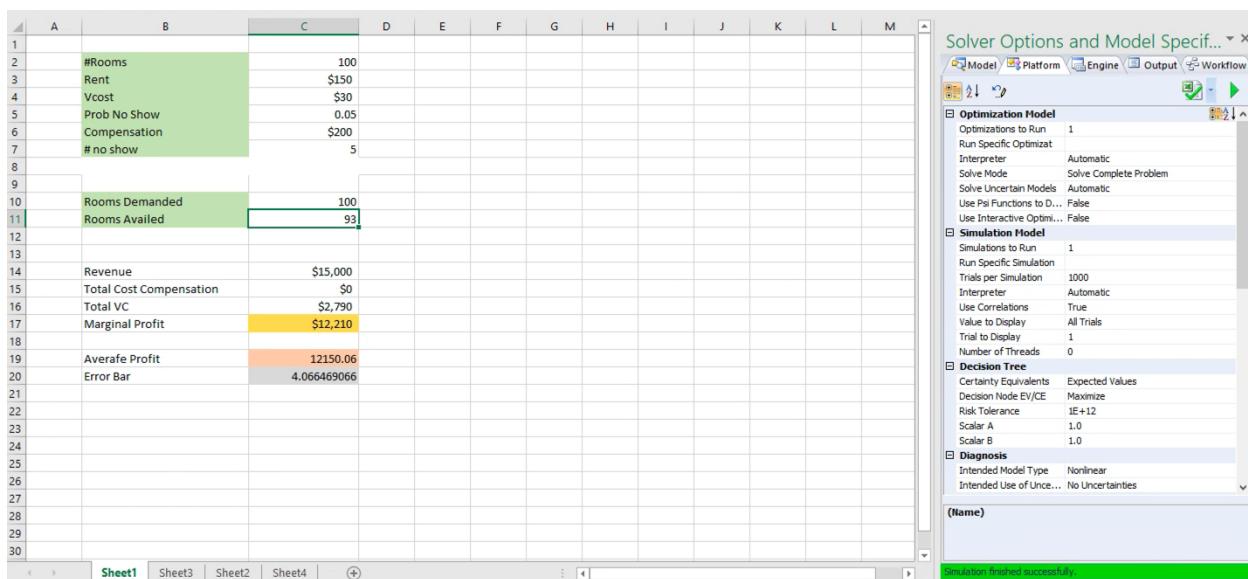
(Name) Simulation finished successfully.

Plot Distribution :

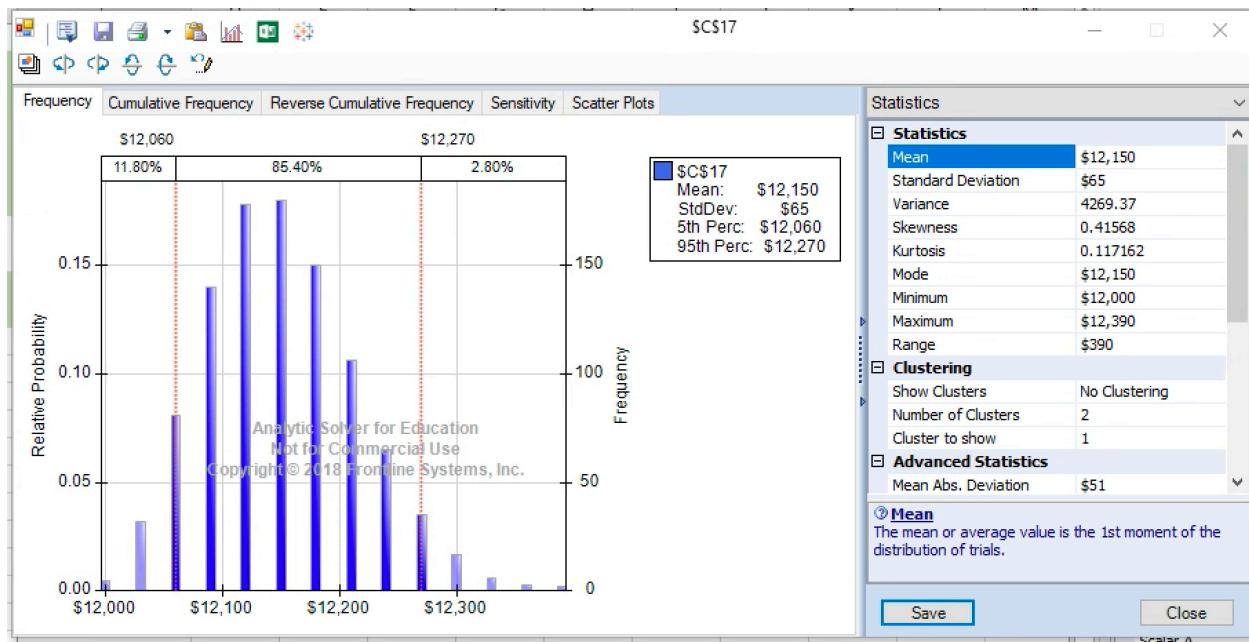


Here are the other simulation screenshots to check maximum profit calculation :

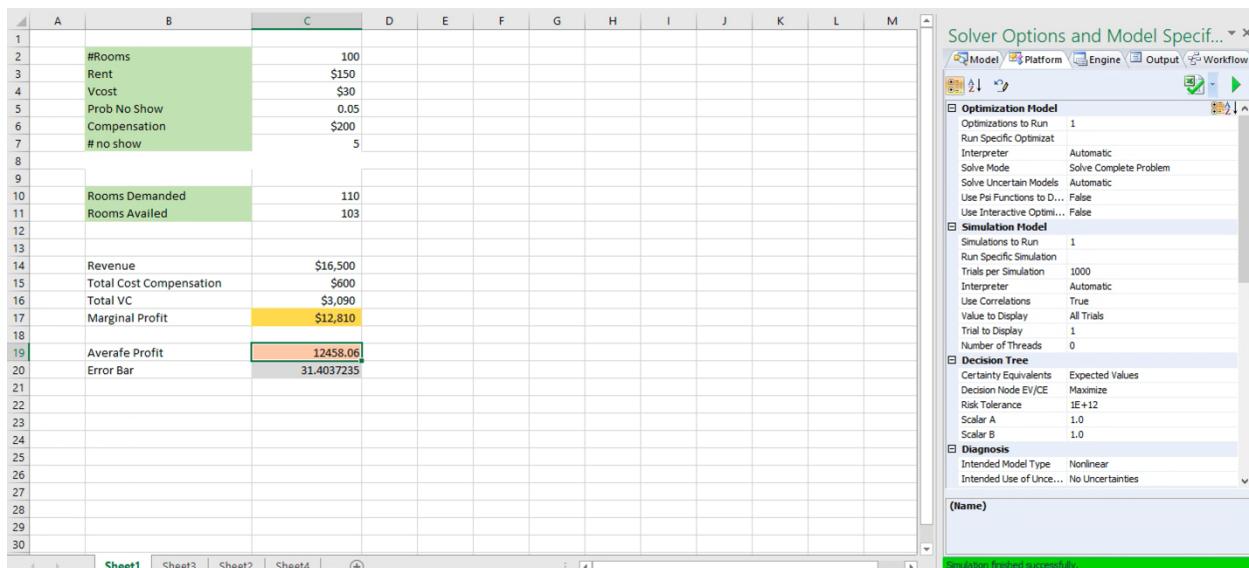
Rooms Demanded: 100



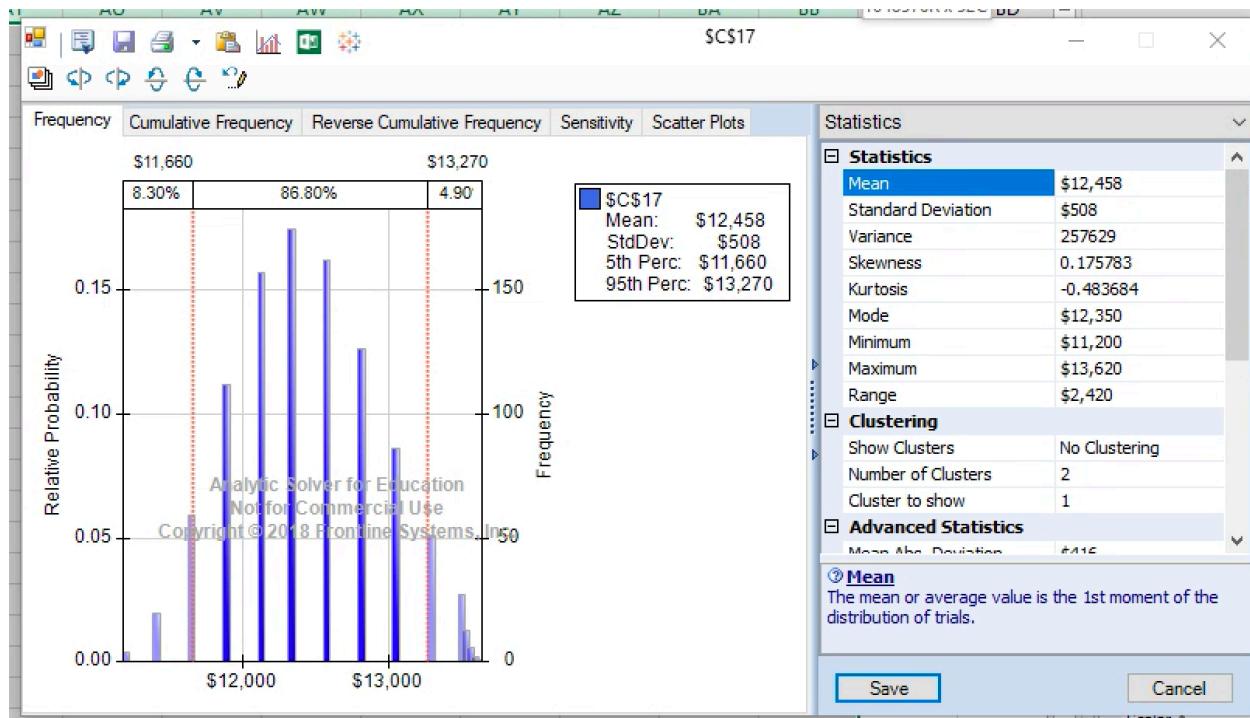
Plot Distribution:



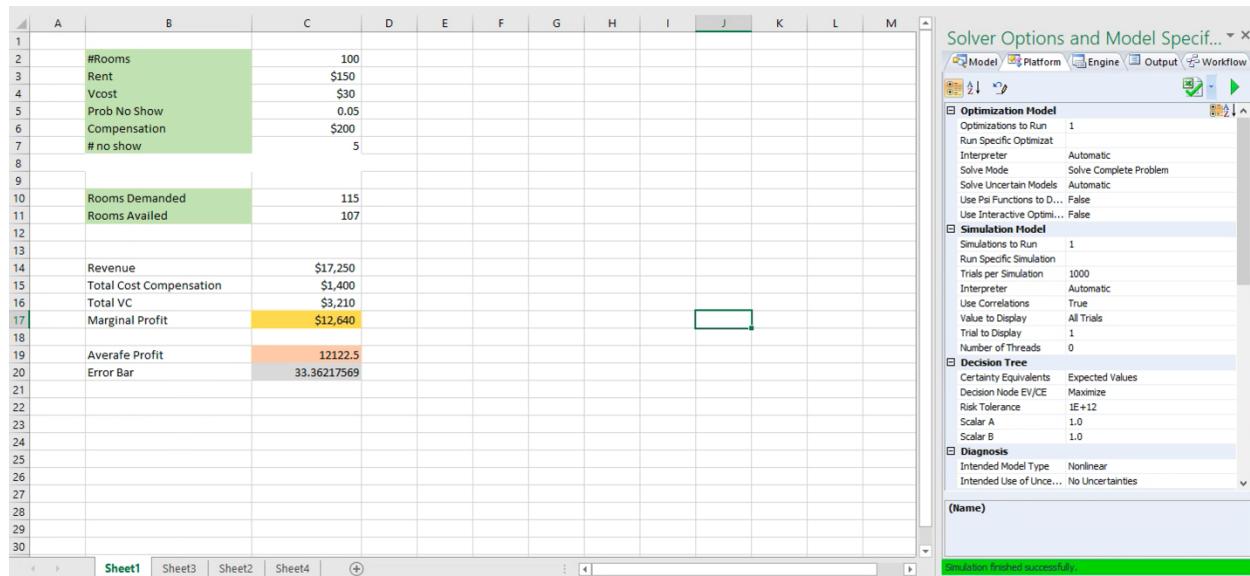
Room Demanded: 110



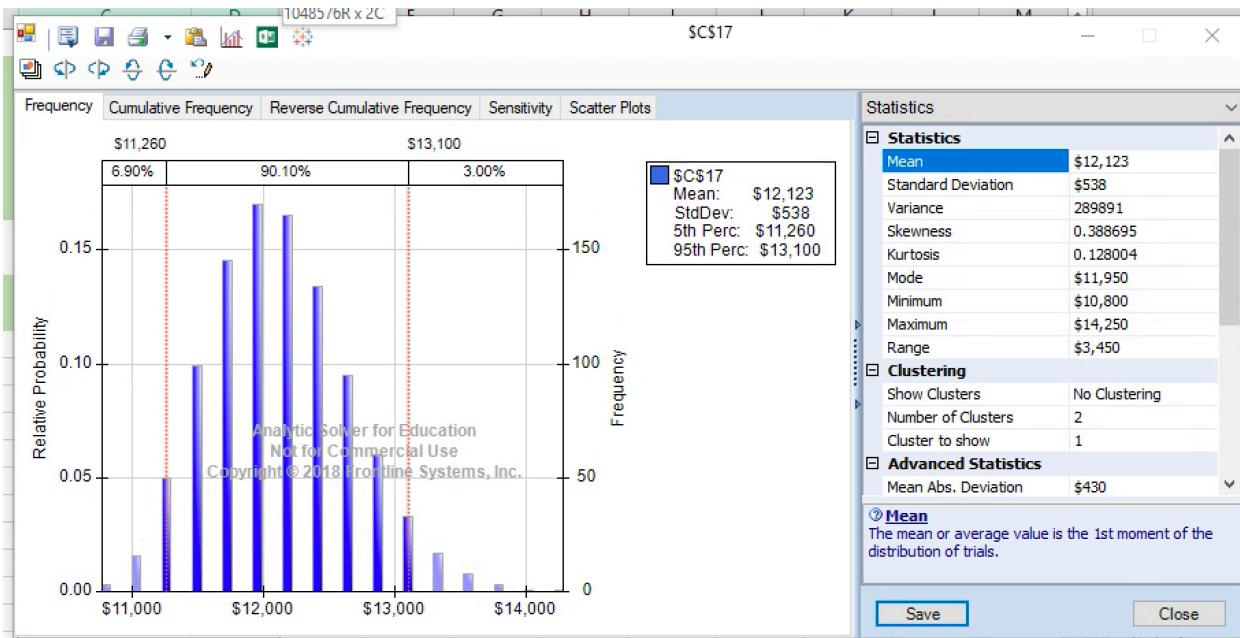
Plot Distribution:



Rooms Demanded: 115



Plot Distribution:



Q1 c)

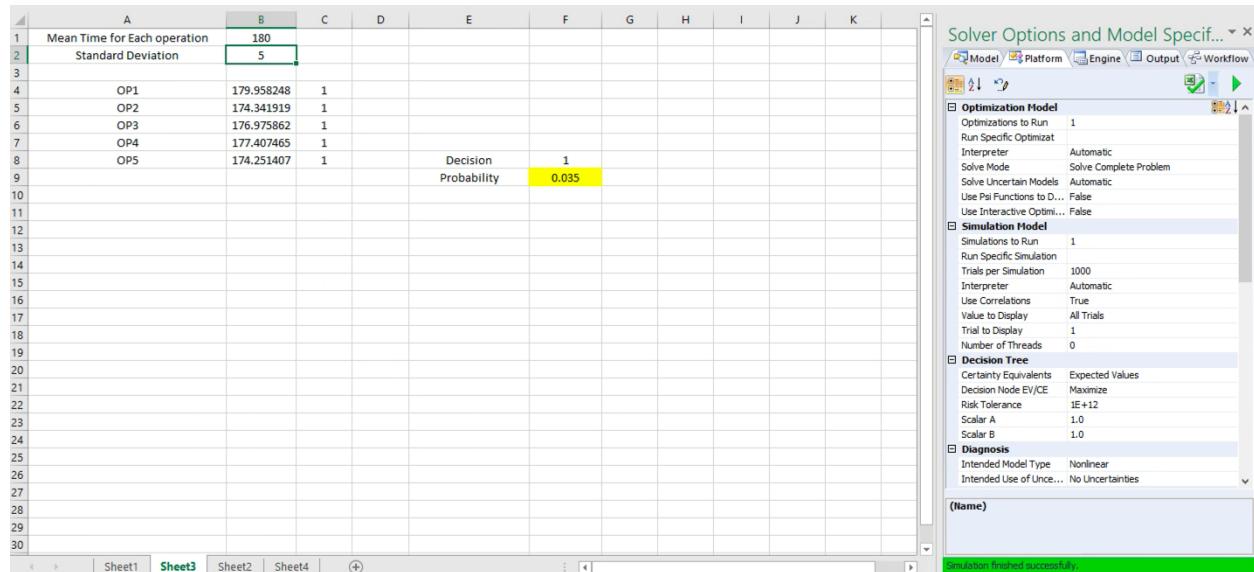
The average daily profit from part b that is, 105 reservations is \$12607.24

Formula Sheet:

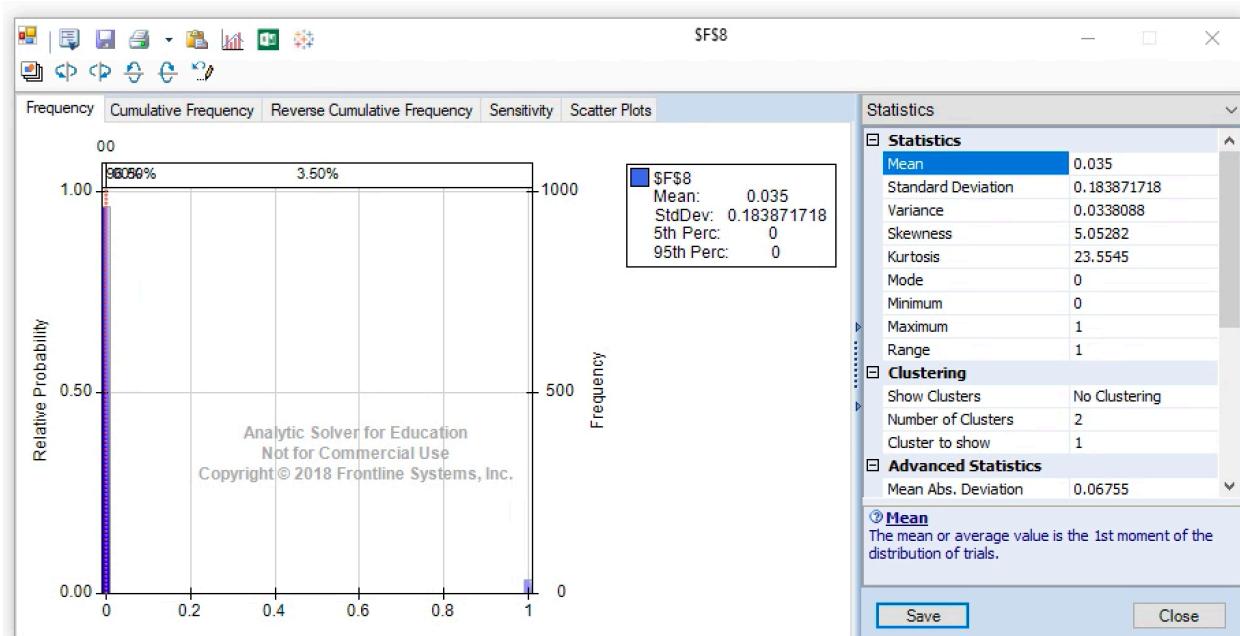
	A	B	C
1			
2	#Rooms		100
3	Rent		150
4	Vcost		30
5	Prob No Show		0.05
6	Compensation		200
7	# no show		=C5*C2
8			
9			
10	Rooms Demanded		115
11	Rooms Availed		=PsiBinomial(C10,1-C5)+PsiOutput()
12			
13			
14	Revenue		=C10*C3
15	Total Cost Compensation		=MAX(C11-C2,0)*C6
16	Total VC		=(C11)*C4
17	Marginal Profit		=C14-C15-C16+PsiOutput()
18			
19	Averafe Profit		=PsiMean(C17)
20	Error Bar		=1.96*PsiStdDev(C17)/SQRT(1000)
21			

Q2 a)

Probability of all five operations to be completed is **0.035**



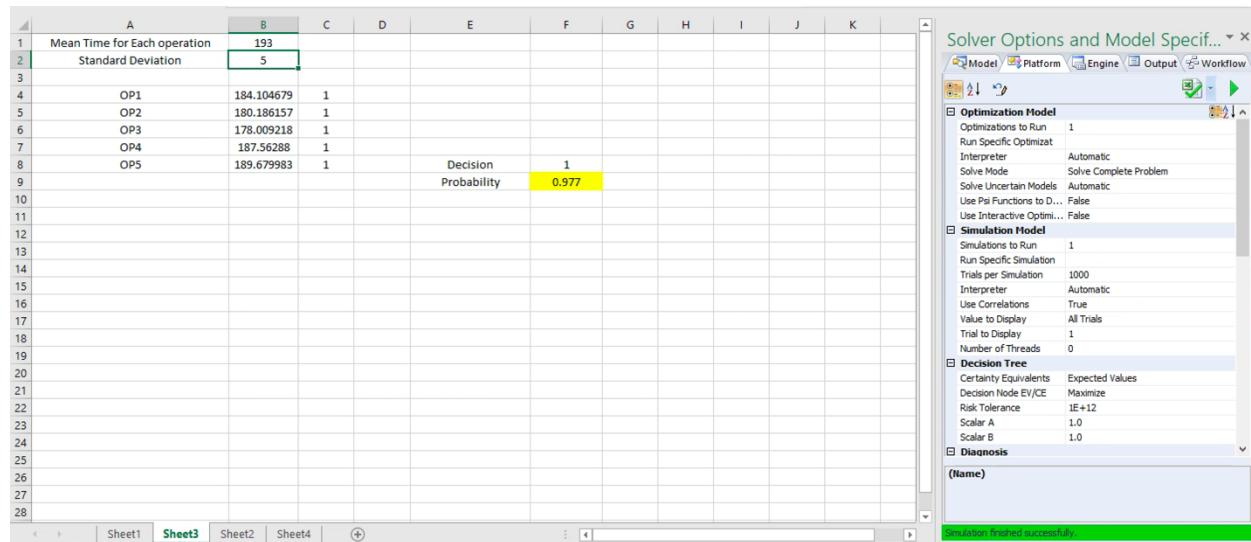
Plot Distribution :



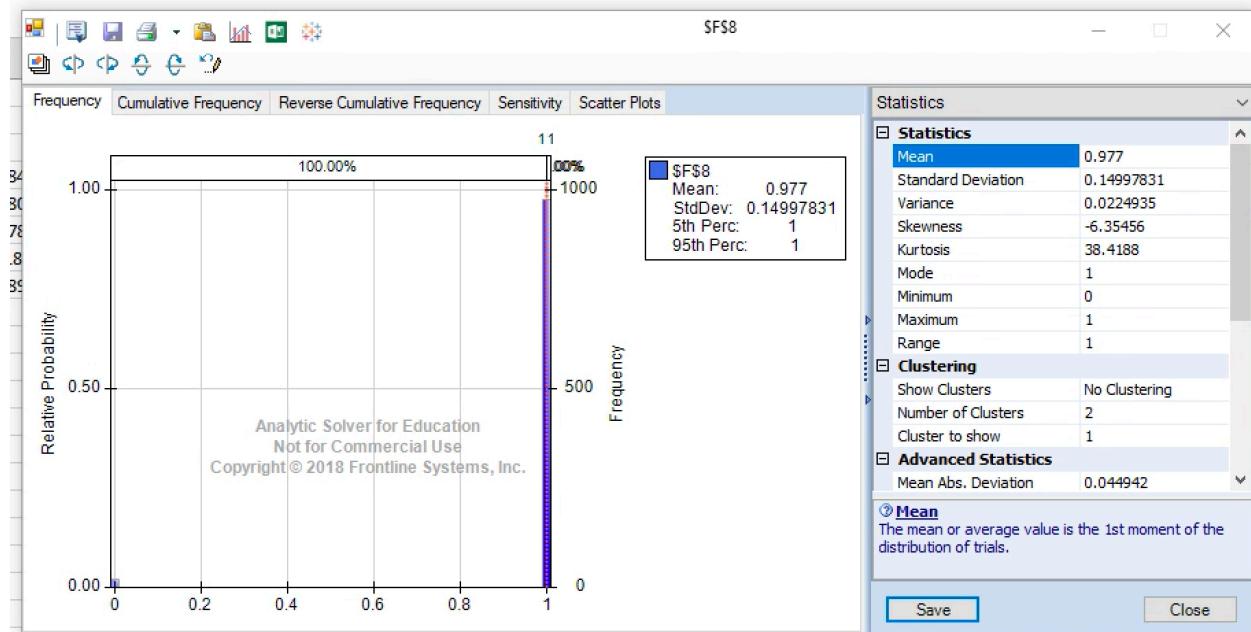
Q2 B)

The cycle time which will ensure that all five operations will get completed in 98% of the time is **194 seconds**

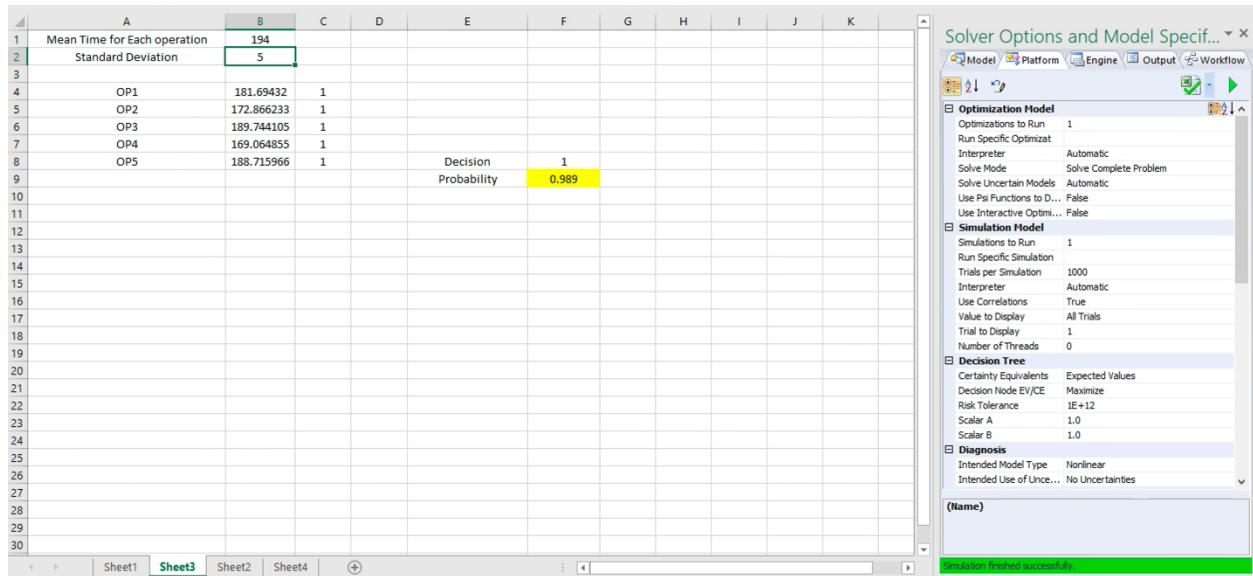
Trial Simulation for converging towards 98% probability:



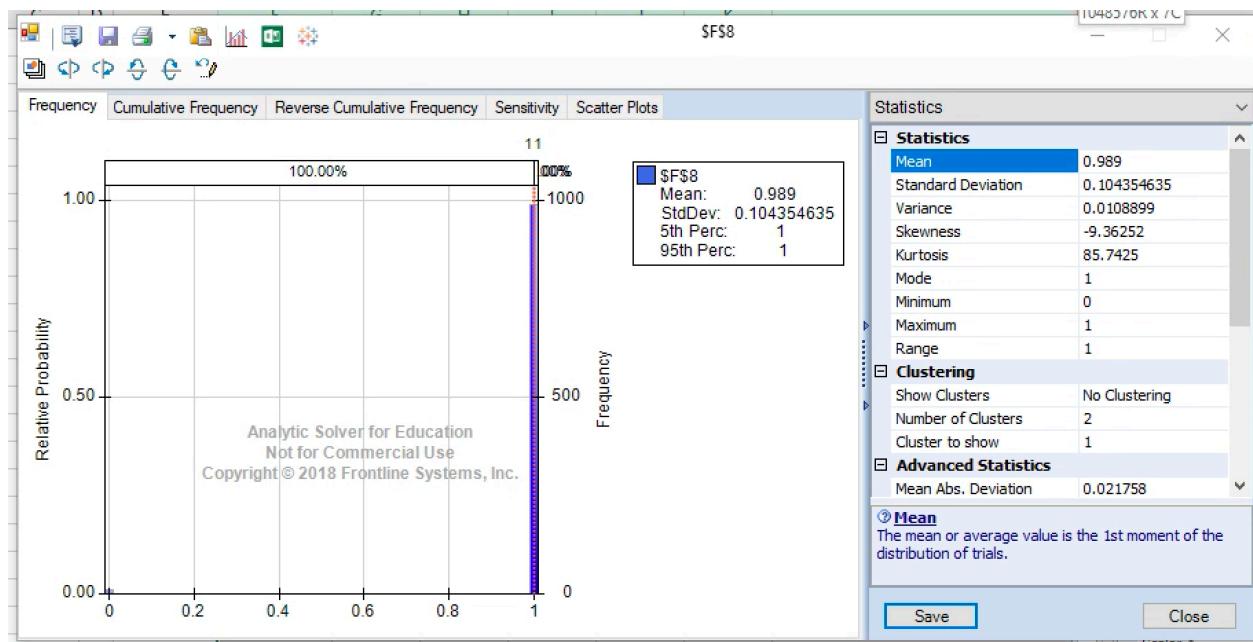
Plot Distribution:



Simulation for cycle time 194 seconds, which converged to 98% probability and ensured all operation completion completed with this probability



Plot Distribution:

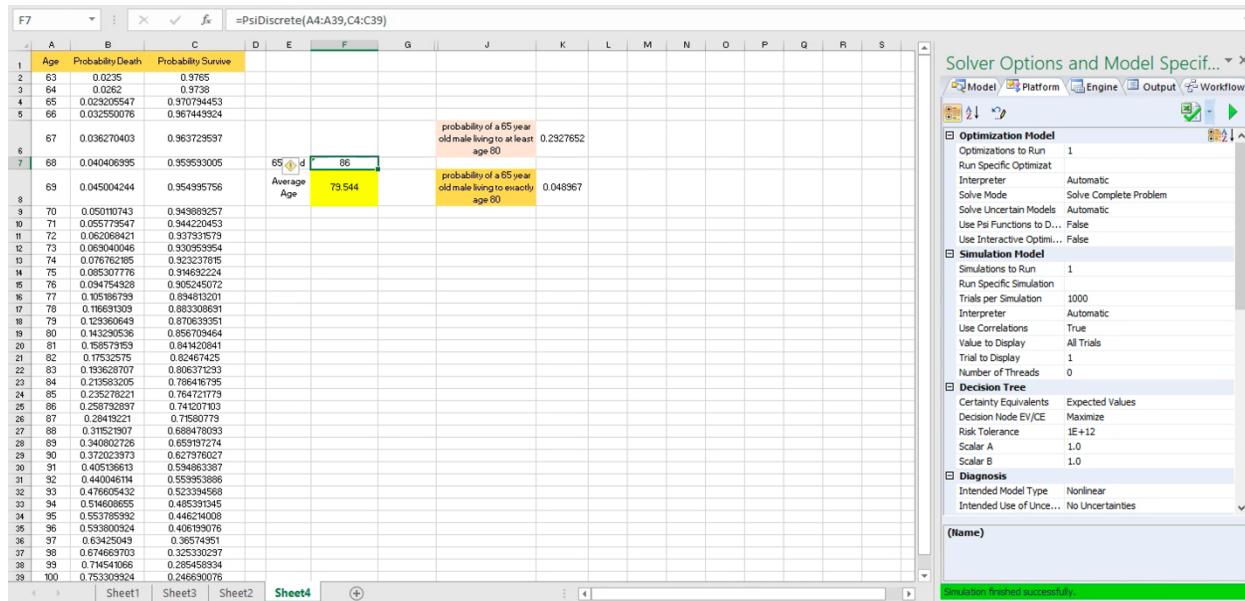


Formula Sheet:

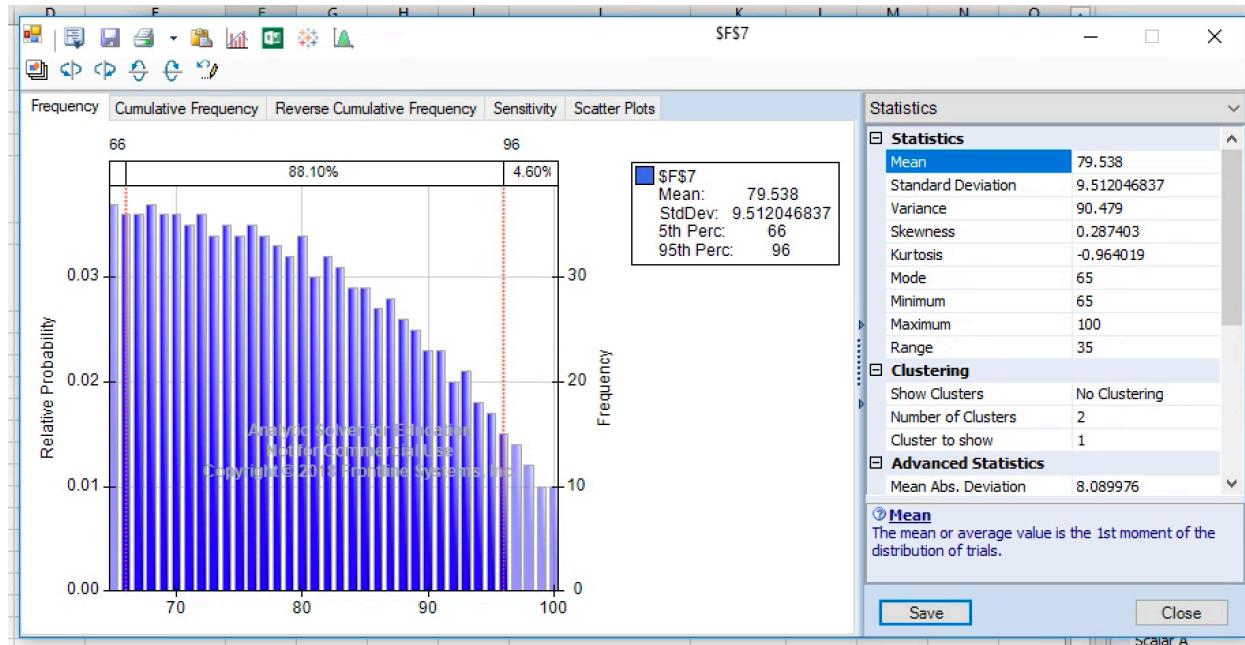
	A	B	C	D	E	F
1	Mean Time for Each operation	194				
2	Standard Deviation	5				
3						
4	OP1	=PsiNormal(180,\$B\$2)	=IF(B4<= \$B\$1, 1, 0)			
5	OP2	=PsiNormal(180,\$B\$2)	=IF(B5<= \$B\$1, 1, 0)			
6	OP3	=PsiNormal(180,\$B\$2)	=IF(B6<= \$B\$1, 1, 0)			
7	OP4	=PsiNormal(180,\$B\$2)	=IF(B7<= \$B\$1, 1, 0)			
8	OP5	=PsiNormal(180,\$B\$2)	=IF(B8<= \$B\$1, 1, 0)	Decision Probability	=AND(C4:C8)+PsiOutput()	
9						=1-PsiTarget(F8,0)
10						
11						
12						
13						
14						
15						
16						

Q3 a)

On average a 65 year old male expects to live **79.544 years**



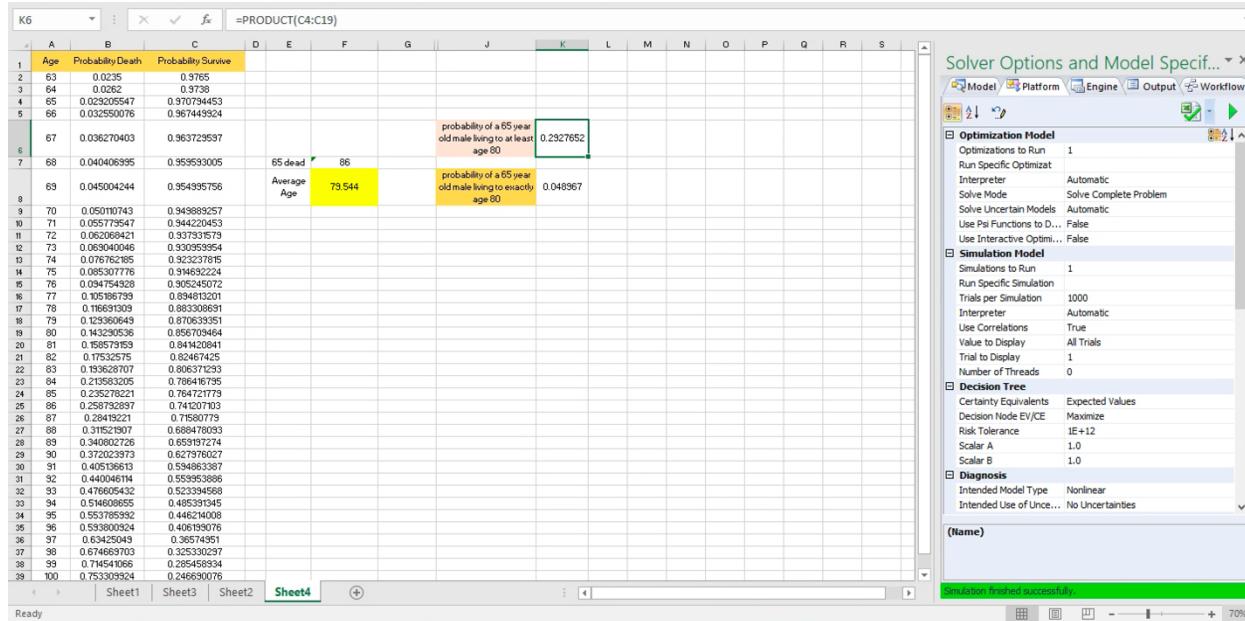
Plot Distribution



Q3 b)

The probability of a 65 year old male living to at least age 80 is **0.2927**

Spread Sheet Implementation



Q3 c)

The probability of a 65 year old male living to exactly age 80 is **0.048967**

Formula Sheet