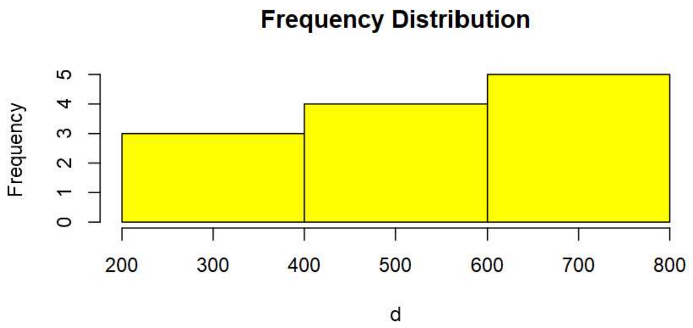
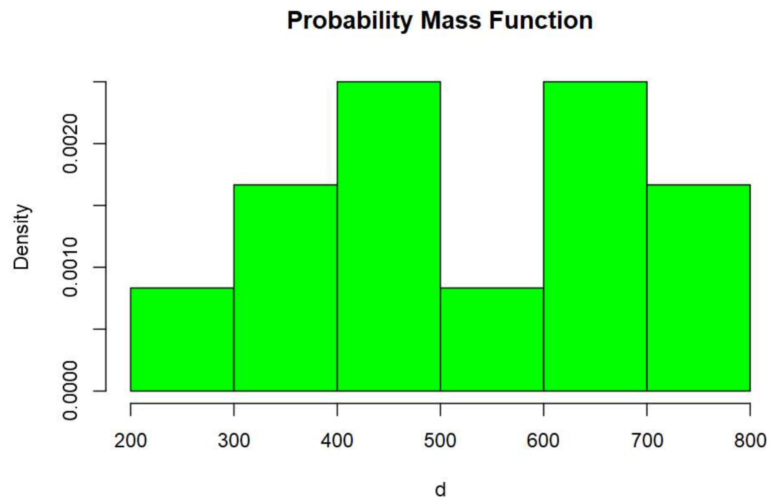
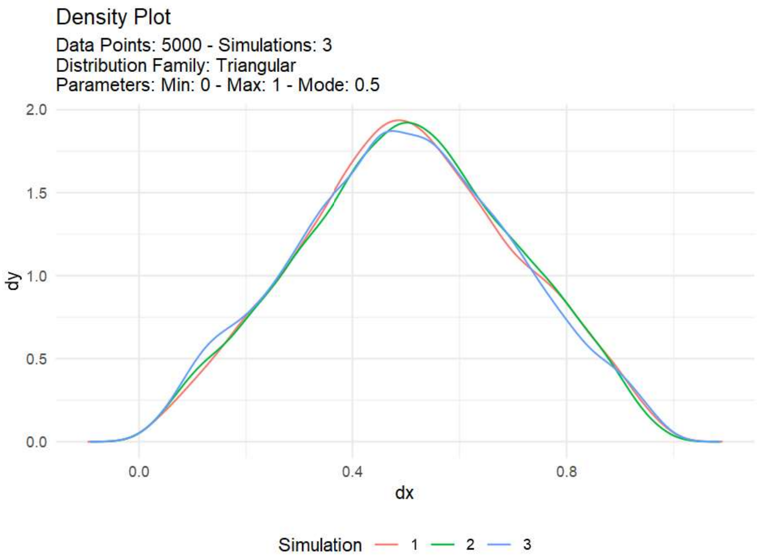
y


Frequency Distribution
Frequency
0
1
2
3
4
5
200
300
400
500
600
700
800
d

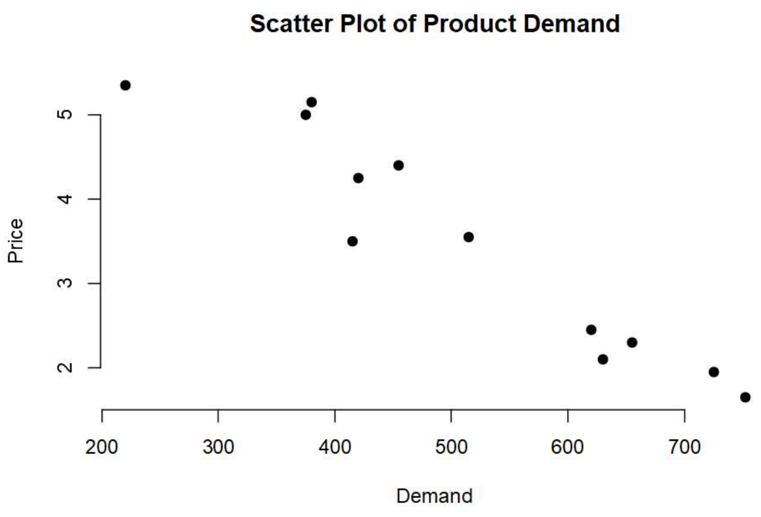
y


Probability Mass Function
Density
0.0000
0.0010
0.0020
200
300
400
500
600
700
800
d


Density Plot
Data Points: 5000 - Simulations: 3
Distribution Family: Triangular
Parameters: Min: 0 - Max: 1 - Mode: 0.5
dy
0.0
0.5
1.0
1.5
2.0
0.0
0.4
0.8
dx
Simulation
1
2
3

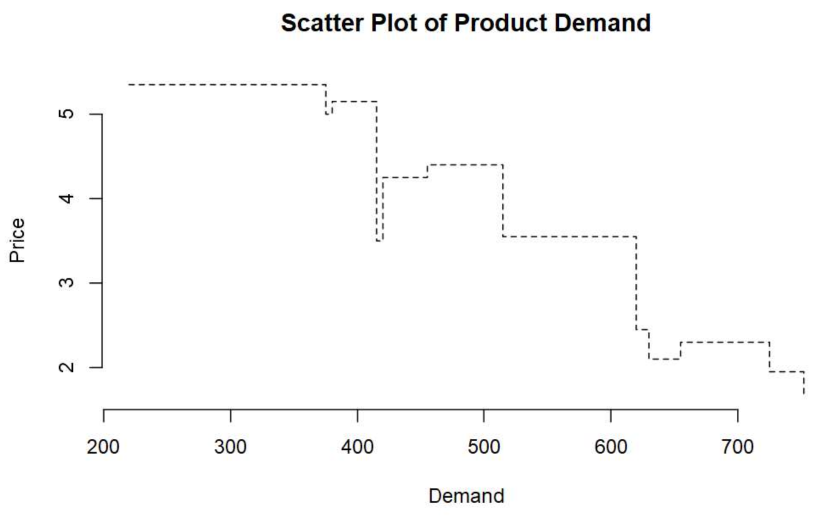

Customer Purchase Behavior
Purchase Amount ($)
50
100
150
200
250
300
0
50
100
150
200
250
300
Time Between Purchases (days)

y



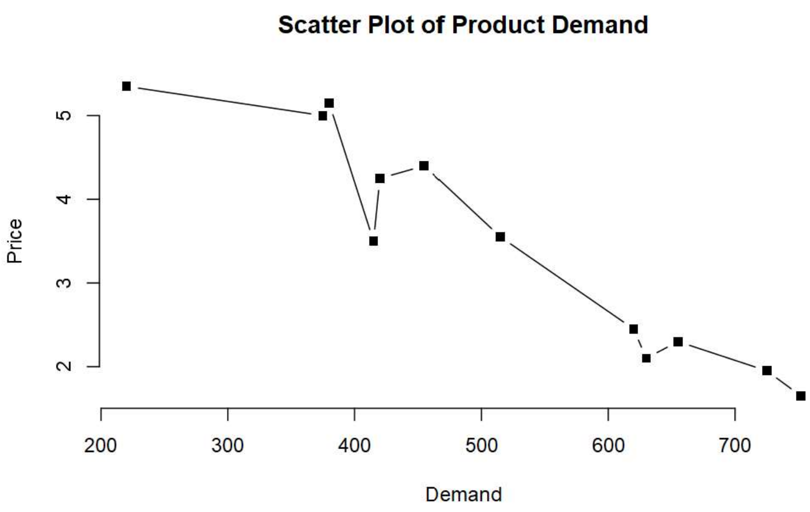
Scatter Plot of Product Demand
Price
Demand
200
300
400
500
600
700
2
3
4
5

y



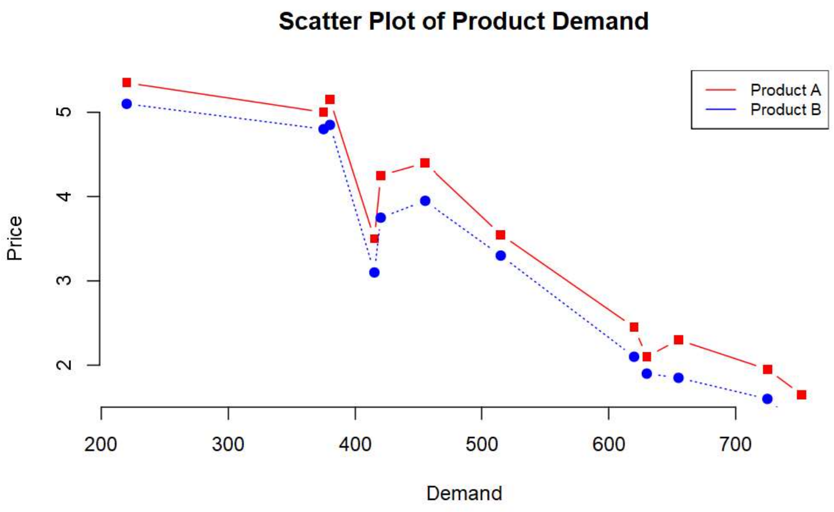
Scatter Plot of Product Demand
Price
Demand
200
300
400
500
600
700
2
3
4
5

y



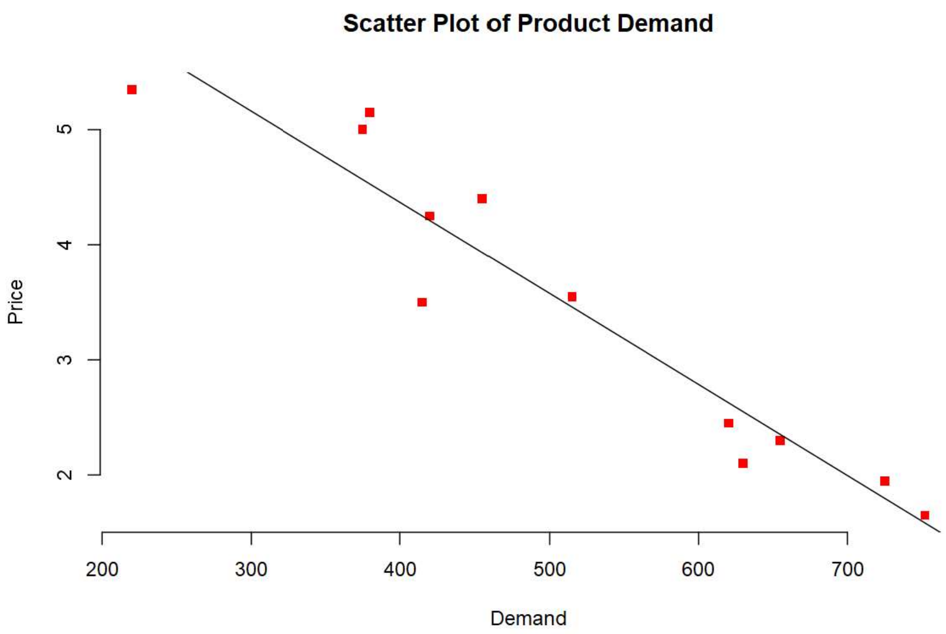
Scatter Plot of Product Demand
Price
Demand
200
300
400
500
600
700
2
3
4
5

y

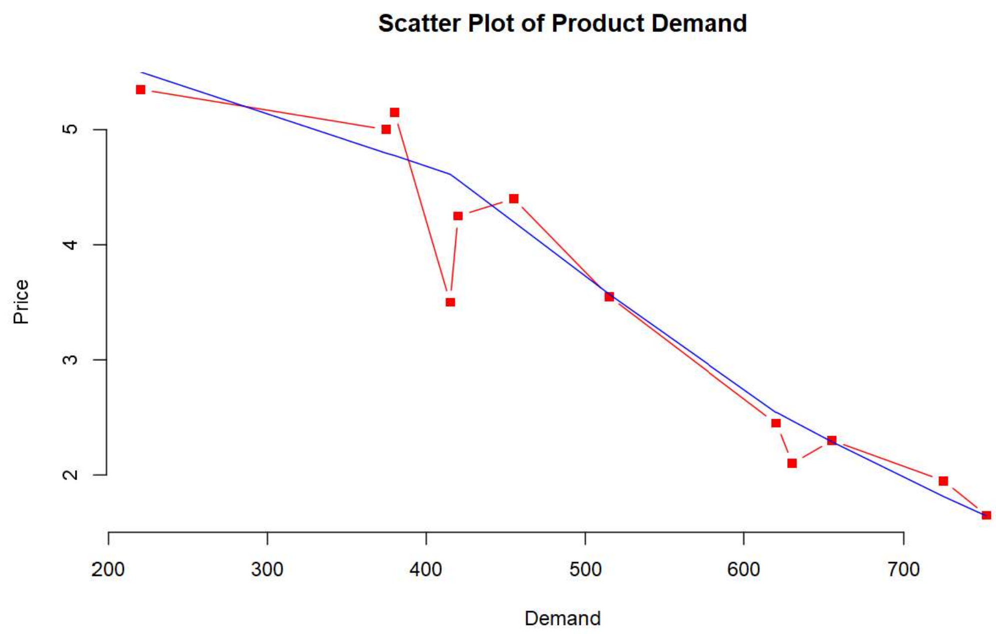


Scatter Plot of Product Demand
Product A
Product B
Price
Demand
200
300
400
500
600
700
2
3
4
5

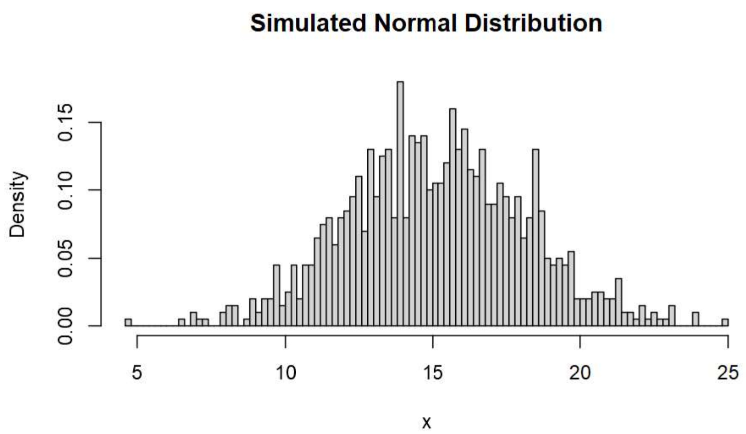
y


Scatter Plot of Product Demand
Price
2
3
4
5
200
300
400
500
600
700
Demand

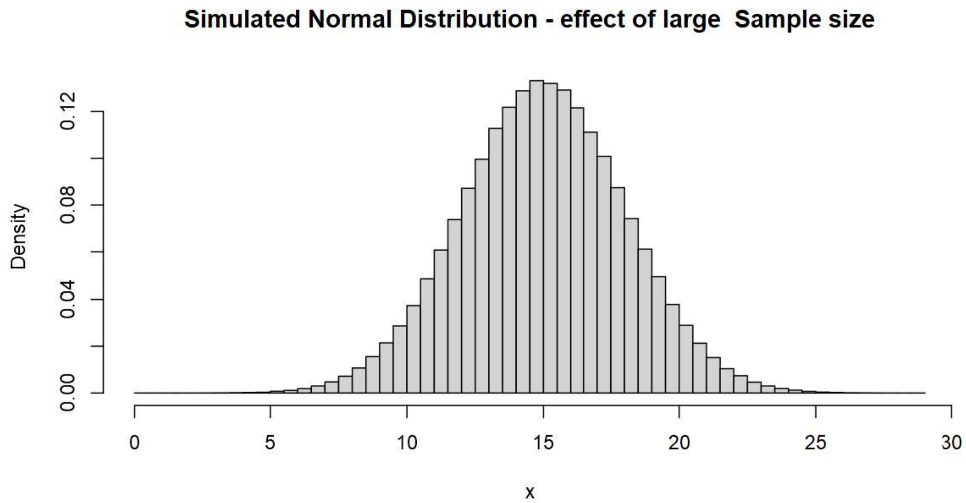
y


Scatter Plot of Product Demand
Price
2
3
4
5
200
300
400
500
600
700
Demand

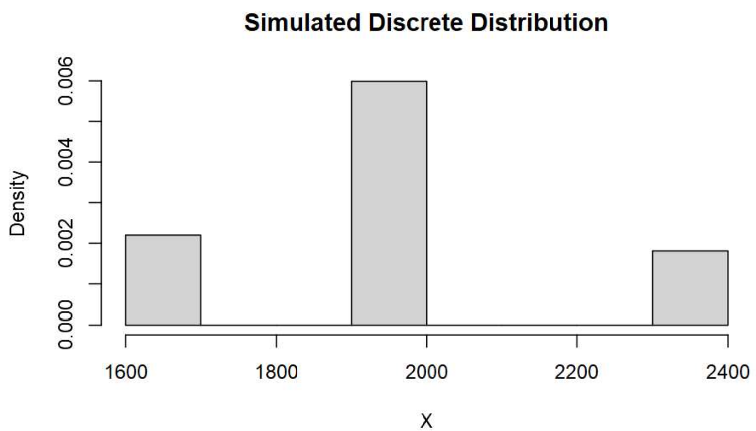
y


Simulated Normal Distribution
Density
0.00
0.05
0.10
0.15
5
10
15
20
25
x

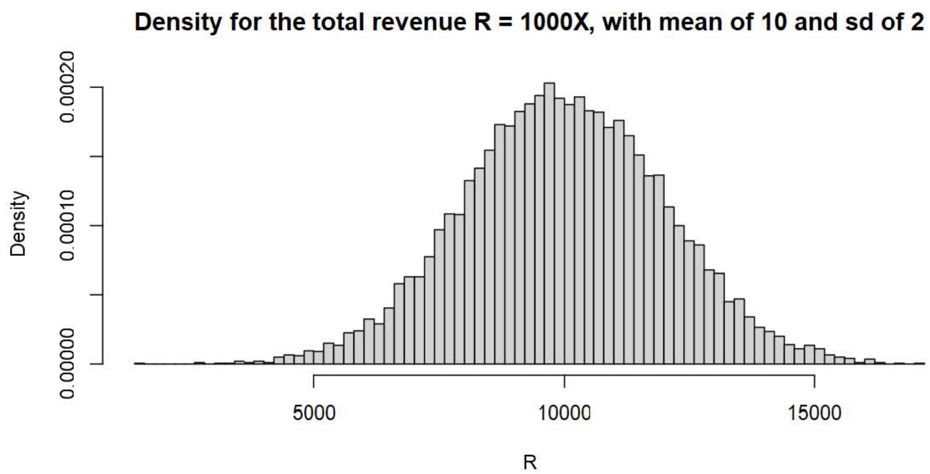
y


Simulated Normal Distribution - effect of large Sample size
Density
0.00
0.04
0.08
0.12
0
5
10
15
20
25
30
x

y


Simulated Discrete Distribution
Density
0.000
0.002
0.004
0.006
1600
1800
2000
2200
2400
X

y


Density for the total revenue R = 1000X, with mean of 10 and sd of 2
Density
0.00000
0.00010
0.00020
5000
10000
15000
R

Service costing at RailWorks Company

Monte Carlo simulation of the passenger service cost for the RailWorks Company (WRC)

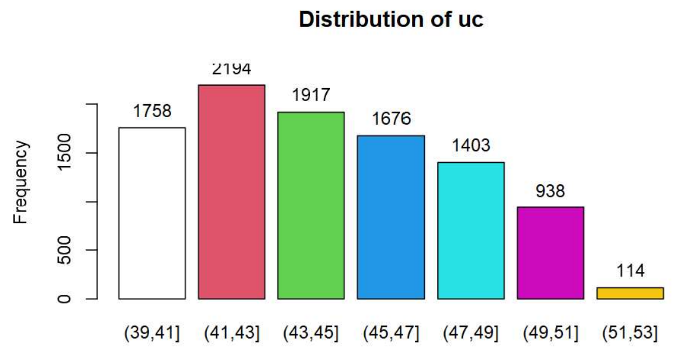
Unknown:
number of passenger cars hauled during a week (P)
number of trips during a week (N)
Uncertainties:
N = Uniform(38,58) and P = Uniform(1620, 2620)
Calculated
The annual total passenger service cost (T)
T = 121,000,000 + 551,200N + 67,600P
The service cost per passenger (c)
c = (121,000,000 + 551,200N + 67,600P) / (3,120P)

The probability of service costs exceeding £275 million
p(X>=275) = 1- p(X<275) = 1- 0.27 = **73%**

The probability of total passenger service costs exceeding £325 million
p(X>=325) is **1.6%**

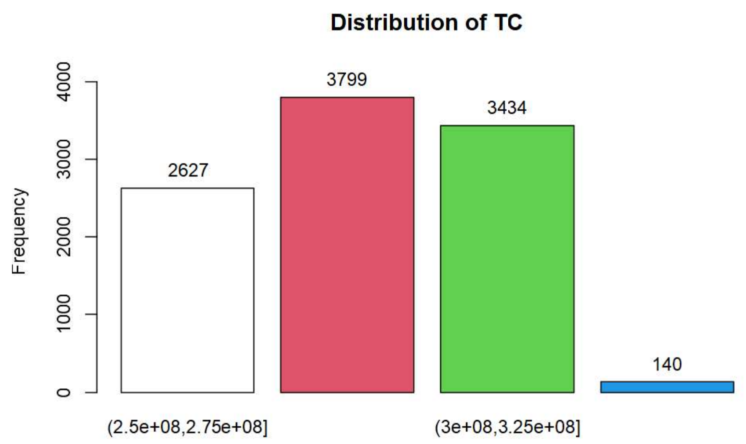
Service Cost per Passenger

based on 10,000 simulations

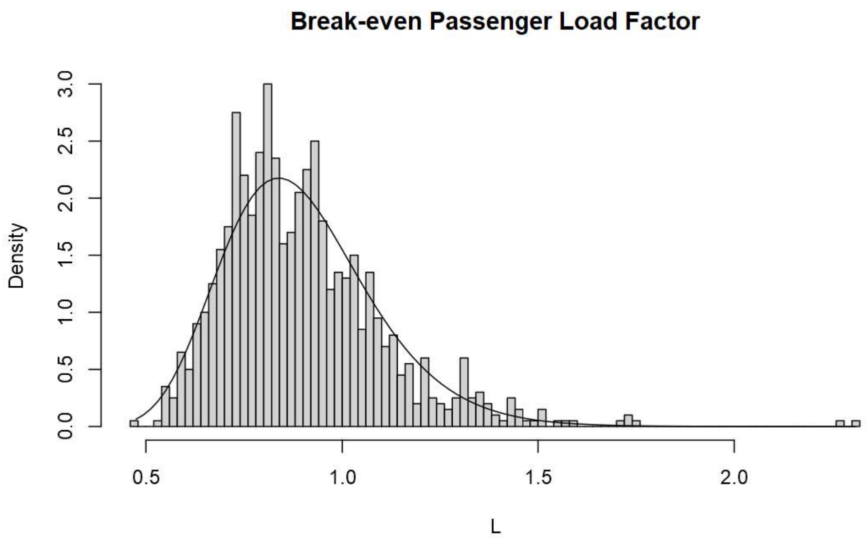


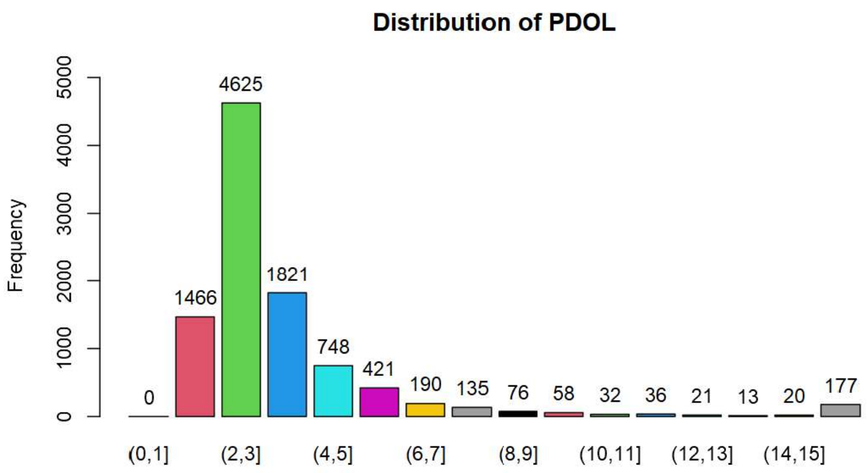
The Simulated Total Passenger Service Cost

based on 10,000 simulations



Cost Volume Profit (CVP) Analysis at RailWorks Company





Unknown:
(P) - number of passenger cars hauled during a week
(N) - number of trips during a week
(S) - the price per passenger ticket
L - the break-even load factor
(∏) - The annual profit
(DOL) - the Degree of Operating Leverage

Uncertainties:
N = Uniform(38,58)
P = Uniform(1620, 2620)
S ~ Normal(40, 5^2)
L = Uniform(0.49, 0.85)

Calculated
T = 121,000,000 + 551,200N + 67,600P
c = (121,000,000 + 551,200N + 67,600P) / (3,120P)
DOL = 1 + (121,000,000/(4160PSL - 551200N - 27040P -54080PL))
∏ = 4160PSL - (121,000,000 + 31200N + 1040P + 1280PL + 520000N + 26000P + 41600PL)
L = (121,000,000 + 551,200N + 27,040P) /(4,160PS - 54,080P)
DOL = 1 + (121,000,000/(4160PSL - 551200N - 27040P -54080PL))

Conclusions:

The mean for DOL is **2.77** times with a SD of 332
The probability of break-even load factor L<100% is **72.9%**
Probability of a break-even load factor 40% < L < 70% is **14.5%**
The highest relative positive DOL frequency is between 2 and 3 times, with **46.8%**

Degree of operating leverage DOL = (sales – variable costs)/(sales - variable costs – fixed costs)