DS 775

Prescriptive Analytics

Simulation Part Two

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Problem 28-8: Reliable Construction Co. Contract Bidding

						Range Name	Cells
Data						CompetitorBids	C8:E8
Our Project Cost ($million)	4.550					MeanProfit	C31
Our Bid Cost ($million)	0.050					MinimumCompetitorBid	C23
						OurBid	C25
Competitor Bids	Competitor 1	Competitor 2	Competitor 3			OurBidCost	C5
Bid ($million)	7.083	5.599	5.907			OurProjectCost	C4
						Profit	C29
Distribution	*Triangular*	*Triangular*	*Uniform*			WinBid?	C27
Competitor Distribution Parameters (Proportion of Our Project Cost)							
Minimum	95%	110%	120%				
Most Likely	130%	125%					
Maximum	160%	140%	130%				
Competitor Distribution Parameters ($millions)							
Minimum	4.323	5.005	5.460				
Most Likely	5.915	5.688					
Maximum	7.280	6.370	5.915				
Minimum Competitor							
Bid ($million)	5.599						
Our Bid ($million)	5.4						
Win Bid?	1	(1=yes, 0=no)					
Profit ($million)	0.800						
Mean Profit ($million)	#N/A						

-6:34   1x

Question 1

DS775 - Simulation Part Two

Question for Self Assessment: Multiple Choice

Simulation and optimization cannot be done at the same time.

○ True

○ False

SUBMIT

Answer is at the end of this transcript

Cell reference: A2

Formula: `=CHISQ.INV(RAND(),15)`

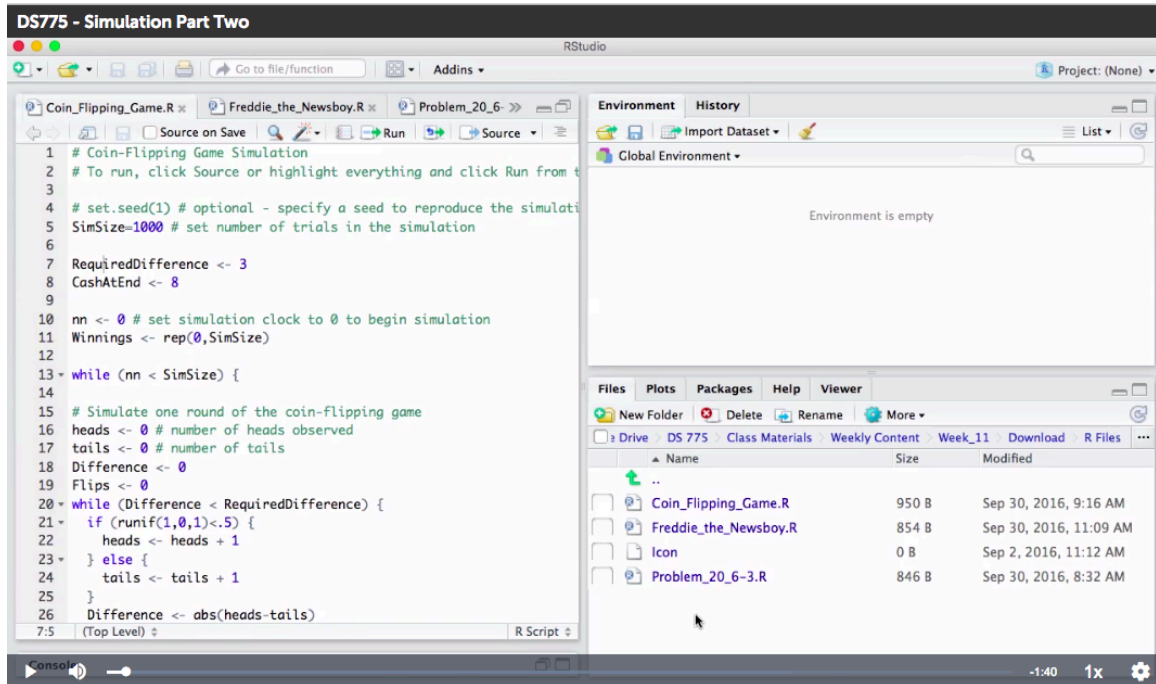|	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	variable1		HeartRate											
2	13.3352401		153.92											
3	10.5149907		164.33											
4	12.8907607		174.50											
5	27.2906984		173.00											
6	8.74158919		163.50											
7	21.0175055		183.67											
8	13.6359486		158.92											
9	12.9068354		153.75											
10	19.5204186		173.33											
11	13.1508562		168.25											
12	16.5610212		182.50											
13	22.2019615		161.50											
14	9.42415775		185.58											
15	10.8641188		140.58											
16	13.1604292		177.75											
17	19.1016273		183.25											
18	11.7092048		156.50											
19	17.2881532		145.17											
20	19.8495756		125.50											
21	13.9158153		152.92											
22	12.4156684		146.17											
23	20.0613277		168.33											
24	7.78185947		140.17											
25	11.3183987		173.17											
26	11.7080501		130.83											
27	8.5512632		170.33											
28	13.7969311		188.42											

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Question 2

DS775 - Simulation Part Two

⦿ Question for Self Assessment: Multiple Choice

If the distribution of a random variable in a simulation is unknown, then a uniform distribution should always be used.

○ True
○ False

SUBMIT

Answer is at the end of this transcript

RStudio

Coin_Flipping_Game.R ×   Freddie_the_Newsboy.R ×   Problem_20_6-

```
1   # Coin-Flipping Game Simulation
2   # To run, click Source or highlight everything and click Run from t
3
4   # set.seed(1) # optional - specify a seed to reproduce the simulati
5   SimSize=1000 # set number of trials in the simulation
6
7   RequiredDifference <- 3
8   CashAtEnd <- 8
9
10  nn <- 0 # set simulation clock to 0 to begin simulation
11  Winnings <- rep(0,SimSize)
12
13  while (nn < SimSize) {
14
15    # Simulate one round of the coin-flipping game
16    heads <- 0 # number of heads observed
17    tails <- 0 # number of tails
18    Difference <- 0
19    Flips <- 0
20    while (Difference < RequiredDifference) {
21      if (runif(1,0,1)<.5) {
22        heads <- heads + 1
23      } else {
24        tails <- tails + 1
25      }
26      Difference <- abs(heads-tails)
```

7:5   (Top Level) ⇕   R Script ⇕

Environment   History

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Global Environment ▾

Environment is empty

Files   Plots   Packages   Help   Viewer

New Folder   Delete   Rename   More ▾

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	▲ Name	Size	Modified
	..		
	Coin_Flipping_Game.R	950 B	Sep 30, 2016, 9:16 AM
	Freddie_the_Newsboy.R	854 B	Sep 30, 2016, 11:09 AM
	Icon	0 B	Sep 2, 2016, 11:12 AM
	Problem_20_6-3.R	846 B	Sep 30, 2016, 8:32 AM

Console

-1:40   1x

Question 1 Answer

DS775 - Simulation Part Two

◉ Feedback for Self Assessment

✓ Correct!

Simulation and optimization cannot be done at the same time.

Your answer:
False

Correct answer:
False

Feedback:
Indeed they can with the right tools.

Question 2 Answer

DS775 - Simulation Part Two

◉ Feedback for Self Assessment

✓ Correct!

If the distribution of a random variable in a simulation is unknown, then a uniform distribution should always be used.

Your answer:
False

Correct answer:
False

Feedback:
Right! The distribution used to model a variable depends on the characteristics of that variable in reality, an educated guess or a distribution fit from historical data should be used to guide the decision.