
FIN 372 / STA 372

Optimization Methods in Finance: Homework 5

This assignment is graded on Credit/No-Credit.

That is, if you complete the homework and it is acceptable, you will get credit. If you don't submit or if the submitted work is not acceptable, you will not get credit. Getting a credit is required to obtain a grade for the group project that follows.

Please write a report that solves the following problems.

Problems 1:

You have purchased a ticket for the 7th game in a 7-game series. Team A has a probability p of winning each game. Find the probability that the series will be decided before the 7th game (that is one of the two teams wins 4 of the first six games). Plot the probability for various values of p in the range 0 to 1.

Problems 2:

Joe drives a bus with forty seats. On average, 10% of the people who buy tickets in advance do not show up. The ticket price is \$10. If one cannot get on the bus with a purchased ticket because the bus is full, \$25 is paid as the compensation. How many seats shall Joe sell in order to maximize his expected revenue?

Problems 3 (Extended Monty Hall Paradox):

Suppose you're on a game show, and you're given the choice of **33** doors: Behind one door is a car; behind the others, goats.

- You pick a door, say No. 1,
- The host, who knows what's behind the other doors, opens **5** doors say No. 2,3,4,5,6. Each has a goat.
- He then says to you, 'Do you want to Switch?' - that is, do you want to pick another door in this case?

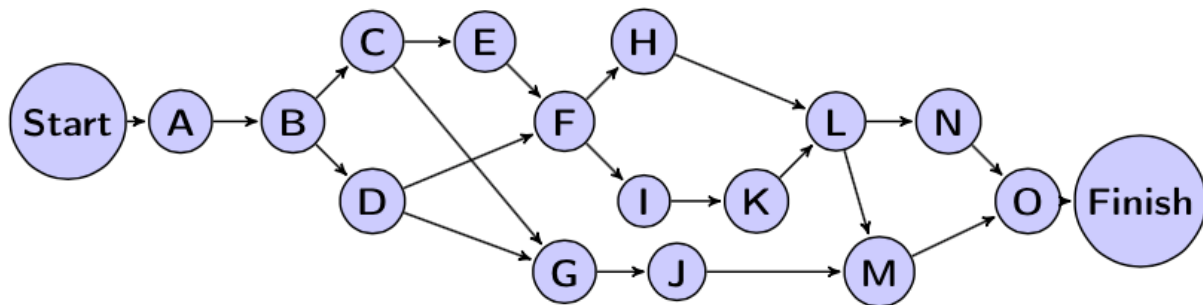
Use simulation to calculate the probability of winning when you decide to stick and the probability of winning when you decide to switch.

Problems 4 PERT (optional) :

The following table gives the information about every activity in the project. (It is the same as the one in the slides).

Activity	Label	Predecessors	Successors	Parameters of PERT distributions		
				Min	Most likely	Max
Dummy Start Node	Start	None	A			
Perform needs analysis	A	Start	B	8	9	16
Develop Specifications	B	A	C,D	4	5	12
Select server	C	B	E,G	5	6	7
Select software	D	B	F,G	4	13	16
Select cables	E	C	F	3	4	5
Purchase equipment	F	D,E	H,I	2	3	4
Develop user manuals	G	C,D	J	4	6	8
Wire offices	H	F	L	10	11	18
Set up server	I	F	K	3	3	3
Develop training program	J	G	M	12	14	16
Install software	K	I	L	3	4	5
Connect network	L	H,K	M,N	2	3	4
Train users	M	J,L	O	8	8	8
Test & debug system	N	L	O	6	11	22
Get management acceptance	O	M,N	Finish	3	4	6
Dummy Finish Node	Finish	O	None			

Here is the network of the project.



Please calculate the expected completion time of the project.

Hint: you can modify the `cpmLanProj.R` (on Canvas) to calculate the longest path.

Problems 5 (optional):

It is a tradition to give Lucky Money in Chinese Lunar New Year. Right now, \$100 lucky money is shared within 10 people in the following way. The first person will get $U_1 \times 100$, where U_1 is a $[0,1]$ uniform distribution. The second person will get U_2 of the remaining money, where U_2 is also a $[0,1]$ uniform distribution. So on and so forth. The last person will get all the remaining. Use simulation to calculate the probabilities that the i th person gets the largest amount where $i = 1, \dots, 10$.

Deliverables

You can either hand write or type your report, but make sure that you submit a PDF file. Please name your report as `hw5_x.pdf` (where x is your eid).

Please submit your code (.R) file online too.