

Exercises for the Final Exam

Question 1: Rating College Football Teams

Consider the following variation of the Rating College Football Teams example we discussed in class. Suppose the home team (column F) and the visiting team (column G) are represented by *Team Index* (as opposed to *Team Name* in the class example).

	A	B	C	D	E	F	G	H	I	J	K	L
1	Rating College Football Teams (2012)				Objective to minimize							
2					Sum squared errors							
3	Home game advantage											
4												
5	Constraint on average rating (any nominal value could be used)				Results of games				Model predictions and errors			
6	Actual average				Week	Home Team	Visiting Team	Home Team Score	Visiting Team Score	Point spread	Predicted spread	Squared error
7					1	2	18	14	56			
8	Nominal average				1	10	27	37	26			
9					1	114	89	13	17			
10					1	84	109	24	49			
11	Ratings of teams				1	24	53	37	0			
12	Team Index	Team Name	Rating		1	16	119	30	6			
13	1	Air Force			1	110	60	27	30			
14	2	Akron			1	70	98	21	35			
15	3	Alabama			1	58	12	17	13			
16	4	Arizona			1	94	87	20	17			
17	5	Arizona State			1	64	74	10	50			
18	6	Arkansas			1	38	122	24	7			
19	7	Arkansas State			1	41	107	38	23			
20	8	Army			1	108	105	29	39			
21	9	Auburn			1	76	56	56	10			
22	10	Ball State			1	81	75	14	24			
23	11	Baylor			1	95	73	41	42			
24	12	Boise State			1	120	51	69	34			
...												
132	121	Western Kentucky			3	39	10	39	41			
133	122	Western Michigan			3	58	74	3	20			
134	123	Wisconsin			3	87	23	40	20			
135	124	Wyoming			3	50	37	63	14			
136					3	61	99	31	66			
...												
664					13	91	74	13	22			
665					13	87	46	52	23			
666					13	35	110	48	10			
667					14	85	49	17	20			
668					14	44	72	37	44			
669					14	94	109	27	24			
670					14	96	77	17	24			
671					14	11	78	41	34			
672					14	107	18	33	27			
673					14	120	42	59	10			
674					14	7	59	45	0			
675					14	29	47	21	35			
676					14	24	20	17	34			
677					14	66	12	21	27			
678					14	33	3	28	32			
679					14	102	68	66	28			
680					14	90	82	3	27			
681					14	34	31	5	21			
682					14	43	99	42	24			
683					14	123	65	70	31			
684					14	35	88	23	7			
685					15	8	64	13	17			

What's the formula for cell K6?

Question 2: Rating College Football Teams (continued)

Specify solver for the Rating College Football Teams problem below:

Set Objective: _____

To: ☐ Max ☐ Min ☐ Value of: _____

By Changing Variable Cells: _____

Subject to the Constraints:

□ Make Unconstrained Variables Non-Negative

Select a Solving Method: _____

Based on your rating results, list the top 3 college football teams below:

Rank	Team
1	
2	
3	

What's the rank for Notre Dame?

Question 4: Crew Scheduling (continued)

Specify solver for the Crew Scheduling problem below:

Set Objective: _____

To: ☐ Max ☐ Min ☐ Value of: _____

By Changing Variable Cells: _____

Subject to the Constraints:

☐ Make Unconstrained Variables Non-Negative

Select a Solving Method: _____

Question 5: Roulette

Consider the following variation of the optimal target hitting strategy in the Roulette example we discussed in class:

- Suppose you have \$200 and you would like to hit the target of \$300.
- Instead of betting on Red or Black, you would like to bet on the 1st Dozen (1-12).

Hint: Since the payoff is 2:1 for the dozen bets, the optimal target hitting strategy should be updated to “Bet *half* of the difference between your current winning and the target if you have enough money; otherwise, bet all you have.”

Based on the following Excel setup,

	A	B	C	D	E	F	G	H	I	J
1	Optimal Target Hitting Strategy									
2										
3	Outcome		Prob.		Target		Bet #	Bet size	Spin result	Winnings
4	1 (your choice: 1st 12)				300		0			200
5	2 (2nd 12)						1			
6	3 (3rd 12)						2			
7	4 (0 or 00)						3			
8							4			
9	Final outcome						5			
10							6			
11	Number of bets						7			
12							8			
13							9			
14							10			
15							11			
16							12			
17							13			
18							14			
19							15			
20							16			
21							17			
22							18			
23							19			
24							20			
25							21			
26							22			
27							23			
28							24			
29							25			
30							26			
31							27			
32							28			
33							29			
34							30			

Specify the following cells (all numbers):

Cell C4: _____ Cell C5: _____ Cell C6: _____ Cell C7: _____

Submission Attempts: ☐ ☐ ☐

Question 6: Roulette (continued)

Specify the following cells (all formulas):

H5: _____

I5: _____

J5: _____

B9: _____

B11: _____

Question 7: Roulette (continued)

Run your @Risk model and answer the following questions based on the simulation results.

- a. What's the probability of hitting the target?

- b. Suppose you would stop betting either when you hit the target or you lose your \$200. What's average number of bets you could place?