Frank Cocuzza
Riddler Express - 7-24 -2020
Riddler Township Presidential Election

Problem: Determine minimum percentage popular vote one candidate can get and still win the election.

Analysis: Assumptions:
- Each shire has 'winner take all' system like most US States, where the popular vote winner in each state receieves all the electoral votes for that state
- All people in all shires vote, and they vote for one of two candidates

Set up a binary variable for whether a candidiate wins a given shire or not.

Multiply the binary variable by the number of electoral votes for each shire. Tally these up.

Multiply the binary variable by the minimum amount of votes required to win an individual shire. *This is calculated by dividing each shire's population by 2 and rounding up to the nearest integer.Tally these up.

Divide the total popular votes by the total population to get popular vote percentage.

Using Excel's Linear Programming 'Solver' function, set the solver to minimize Popular Vote% while subjected to the constraints of:

-Total electoral votes won must be 38 or greater
-Binary variable is limited to 0 or 1

	A	B	C	=BxC	=A/2*xC
	Population	Electoral Votes	Win Shire?	Electoral Votes Won	Min Votes Req'd
Oneshire	11	3	1	3	6
Twoshire	21	4	1	4	11
Threeshire	31	5	1	5	16
Fourshire	41	6	1	6	21
Fiveshire	51	7	0	0	0
Sixshire	61	8	1	8	31
Sevenshire	71	9	0	0	0
Eightshire	81	10	0	0	0
Nineshire	91	11	0	0	0
Tenshire	101	12	1	12	51
Totals	560	75		38	136
			Electoral Votes Required for Win	38	
			Popular Vote %	24.3%	

Result: The minimum popular vote percentage a candidiate can receive and still win a majority of the electoral vote is 24.3%.