The Four Solutions to Problem 5

4. Metropolis-Hastings Acceptance Ratios

accepting Q1 → Q2 : 1

accepting Q2 → Q1 : 1

accepting Q2 → Q3 : 1

accepting Q3 → Q2 : $\frac{1}{2}$ = 0.50

accepting Q3 → Q4 : 1

accepting Q4 → Q3 : $\frac{2}{3}$ = 0.67 or 0.667 or …

5. Metropolis-Hastings Applied

TO EMPHASIZE THAT SOME COIN FLIPS ARE IGNORABLE, I x'd out the ignorable ones below.

SO WE ALL HAVE THE SAME INTERPRETATION, a 0 in the coin column means propose to go left, and a 1 means propose to go right (a decision is only needed when the current bin is bin 2 or 3)

TO RANDOMLY DECIDE THE STARTING BIN:

Name has 5 letters: **Round 1 has starting bin 1** (Jacob, Rania, Sasha)

Name has 6 letters: **Round 1 has starting bin 2** (Jeremy)

Name has 3 letters or 7 letters: **Round 1 has starting bin 3** (Ada, Ren, Rebecca)

Name has 4 letters: **Round 1 has starting bin 4** (Ruby, Tahm)

Starting Bin 1

Out[◦]//TableForm=

round	current bin	coin	proposed bin	random	result bin
1		0		0.26	
2		1		0.62	
3		1		0.07	
4		0		0.66	
5		0		0.52	
6		0		0.96	
7		1		0.95	
8		1		0.54	
9		0		0.02	
10		1		0.76	

Starting Bin **2**

Out[◦]//TableForm=

round	current bin	coin	proposed bin	random	result bin
1		0		0.26	
2		1		0.62	
3		1		0.07	
4		0		0.66	
5		0		0.52	
6		0		0.96	
7		1		0.95	
8		1		0.54	
9		0		0.02	
10		1		0.76	

Starting Bin **3**

Out[◦]//TableForm=

round	current bin	coin	proposed bin	random	result bin
1		0		0.26	
2		1		0.62	
3		1		0.07	
4		0		0.66	
5		0		0.52	
6		0		0.96	
7		1		0.95	
8		1		0.54	
9		0		0.02	
10		1		0.76	

Starting Bin **4**

Out[◦]//TableForm=

round	current bin	coin	proposed bin	random	result bin
1		0		0.26	
2		1		0.62	
3		1		0.07	
4		0		0.66	
5		0		0.52	
6		0		0.96	
7		1		0.95	
8		1		0.54	
9		0		0.02	
10		1		0.76	

If you got some of the acceptance ratios wrong, or had some different interpretation, I made a pragmatic effort to check what you did anyway.