



Name: _____ Per: _____

Probability and Simulations Extra Credit Opportunity

Many times in the world, professionals use something called a simulation, a model of a real-world event. We are going to see whether the simulation does better than you in predicting real-world events, in this case: the results from the March Madness college basketball tournament.

First, you need to fill out a bracket for this year’s tournament based on your own personal picks. Points are awarded for picking the correct winner and each round is worth double the prior round. For example, if you pick a winner correctly in the first round it is worth 1 pt, 2 pts in the second round, 4 pts in the third round (Sweet 16), 8 pts in the fourth round (Elite 8), 16 points in the fifth round (Final Four), and 32 points for picking the champion correctly. Once you have filled in your personal bracket, follow the steps below to fill in your simulation bracket.

Below, I have shared the results from all other prior tournaments. It shows the probability of each seed making it to and winning a game in that round.

Seed	1st Round	2nd Round	3rd Round	4th Round	5th Round	6th Round (Championship)
1	99%	87%	70%	40%	23%	15%
2	94%	64%	47%	22%	11%	4%
3	84%	50%	24%	11%	7%	4%
4	80%	46%	16%	10%	3%	1%
5	64%	33%	6%	5%	2%	0%
6	64%	33%	11%	2%	2%	1%
7	61%	18%	7%	2%	1%	1%
8	50%	10%	6%	4%	2%	1%
9	50%	4%	2%	1%	0%	0%
10	39%	18%	6%	1%	0%	0%
11	36%	15%	5%	2%	0%	0%
12	36%	16%	1%	0%	0%	0%
13	20%	5%	0%	0%	0%	0%
14	16%	2%	0%	0%	0%	0%
15	6%	1%	0%	0%	0%	0%
16	1%	0%	0%	0%	0%	0%

You will use these results and probabilities to run a simulation of the tournament. How it works is as follows.

For example: In the first round a 5 seed plays a 12 seed. A 5 seed wins in the first round 64% of the time and a 12 seed wins in that round 36% of the time.

Step 1: Add the two probabilities together. Here, it would be $64 + 36 = 100$.

Step 2: Assign the higher seed the numbers corresponding to its probability. In this case, the 5 seed gets the numbers 1-64. If two teams play with the same seed, pick one to get the first group of numbers.

Step 3: Assign the lower seed the remaining numbers. In this case, the 12 seed gets the numbers 65-100.

Step 4: Use an online random number generator (random.org/integers/) to run the simulation by having it pick 1 number between two values.

If the generator picked a number between 1-64, you would advance the 5 seed. If a number between 65 and 100 was picked, you would select the 12 seed to advance.

*If a team plays against another team who has a probability of 0, the team with 0 probability automatically loses. If two teams with 0 come across one another, run the simulation as if they were 1 and 1.

As one more example:

Let's say a 1 seed plays an 8 seed in the second round. A 1 seed wins 87% of the time in the second round and an 8 seed wins 10% of the time. Adding these together you get 97. The 1 seed gets the numbers 1-87 and the 8 seed gets the numbers 88-97. Run the random number generator to pick the winner.

Step 5: Repeat this process until all games have been simulated.

Step 6: Record your simulated bracket on the back of where you did your personal picks.

Step 7: As the tournament goes on, track your progress against mathematics below!

Personal Picks Bracket

	Correct in Round 1	Correct in Round 2	Correct in Round 3	Correct in Round 4	Correct in Round 5	Correct in Round 6
Scale Factor	x 1	x2	x4	x8	x16	x32
Points						
					Total Points:	

Simulated Bracket

	Correct in Round 1	Correct in Round 2	Correct in Round 3	Correct in Round 4	Correct in Round 5	Correct in Round 6
Scale Factor	x 1	x2	x4	x8	x16	x32
Points						
					Total Points:	

Once the tournament is over, turn in your two brackets, your results from the filled in tables above, and a brief statement comparing how you did compared to your simulation for extra credit. Have fun!