CS 475/575 -- Spring Quarter 2022
Project #1
OpenMP: Monte Carlo Simulation

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1. Choosing one of the runs (the one with the maximum number of trials would be good), tell me what you think the actual probability is.

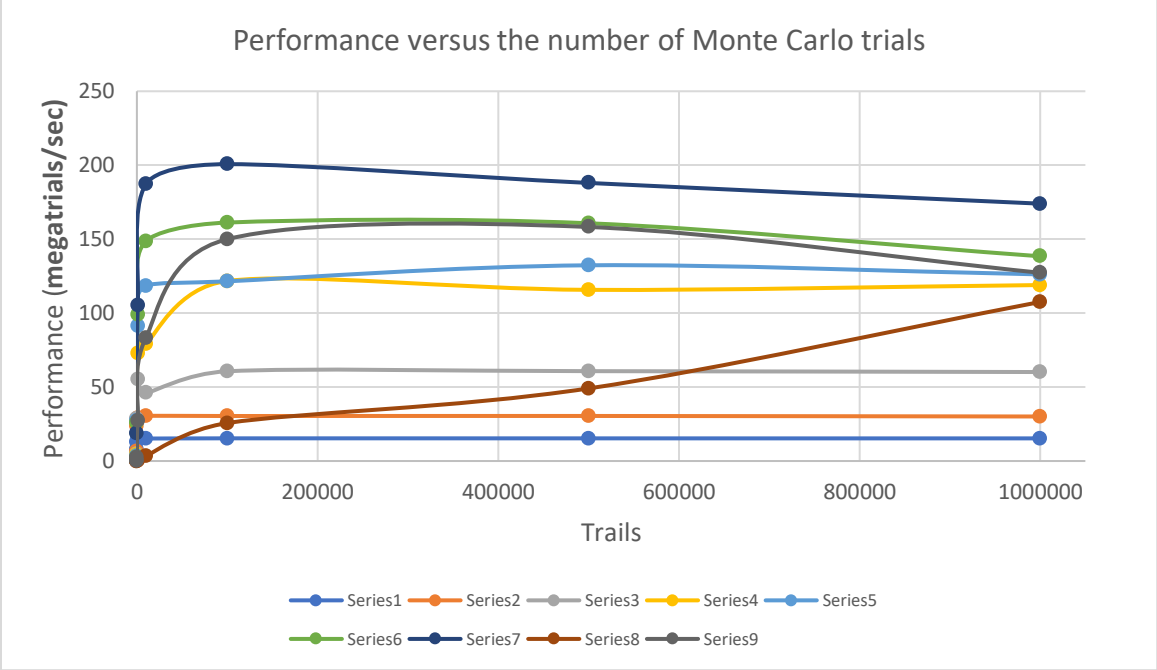
The actual probability might be between 28% to 31% (checked probabilities for trails between 10000 to 1000000)

threads	trails	megatrials/sec	probability
8	100000	121.71	28.78
8	500000	115.73	29.05
8	1000000	118.98	29.06
12	100000	121.48	29.19
12	500000	132.33	29.12
12	1000000	126.17	29.1
16	100000	161.22	28.67
16	500000	160.74	28.98
16	1000000	138.43	29.07
20	100000	200.71	29.26
20	500000	188.01	29.25
20	1000000	174	29.08
24	100000	25.65	29.06
24	500000	49.07	29.14
24	1000000	107.55	29.06
32	100000	149.97	29.08
32	500000	158.25	29.09
32	1000000	127.28	29.03

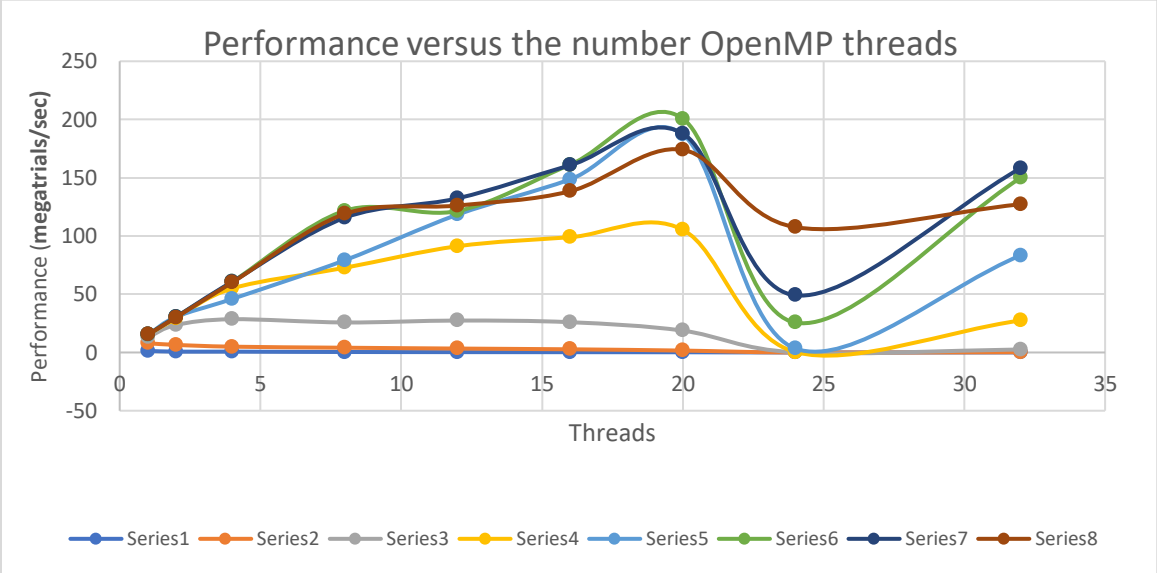
2. Do a table and two graphs. The two graphs need to be:

Threads\Trails	1	10	100	1000	10000	100000	500000	1000000
1	1.37	7.94	13.04	15.21	15.2	15.34	15.32	15.31
2	0.72	6.5	23.58	29.15	30.57	30.43	30.47	30.1
4	0.73	4.97	28.55	55.01	46.02	60.67	60.75	60.17
8	0.41	4.08	25.77	72.73	79.23	121.71	115.73	118.98
12	0.31	3.36	27.4	91.21	118.36	121.48	132.33	126.17
16	0.25	2.72	26	98.96	148.6	161.22	160.74	138.43
20	0.18	1.64	18.75	105.37	187.17	200.71	188.01	174
24	0	0	0.05	0.4	3.38	25.65	49.07	107.55
32	0.02	0.24	2.59	27.51	83.37	149.97	158.25	127.28

a) Performance versus the number of Monte Carlo trials, with the colored lines being the number of OpenMP threads.



b) Performance versus the number OpenMP threads, with the colored lines being the number of Monte Carlo trials.



3. Compute Fp, the Parallel Fraction, for this computation.

```
[kondab@flip2 ~/term3/parallel/project1$] g++ -o program1 project1.cpp -lm -fopenmp && .
/program1
32 threads :   200000 trials ; probability =  29.16% ; megatrials/sec = 117.54
```

```
[kondab@flip2 ~/term3/parallel/project1$] g++ -o program1 project1.cpp -lm -fopenmp && .
/program1
 1 threads :   200000 trials ; probability =  28.97% ; megatrials/sec =  10.55
```

Fp = (4./3.)*(1. - (1./S))

= (4./3.) * (1. – 0.0542)
= (4./3.) * 0.9458
= 0.998

S = 117.54/10.55 =11.141 (32 core:1core)

1. / S = 0.089