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Project #1
CS 475/575
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Table:

	1	10	100	1000	10000	100000	500000
1 Thread	1.35	6.69	8.76	8.35	8.95	9.01	8.9
2 Threads	0.52	4.28	15.36	17.8	17.27	17.34	17.66
4 Threads	0.36	5.4	11.66	28.07	28.64	29.92	31.42
8 Threads	0.36	2.79	19.53	44.66	47.74	53.68	52.1

Fig. 1.1 Monte Carlo Performance table.

Graphs:

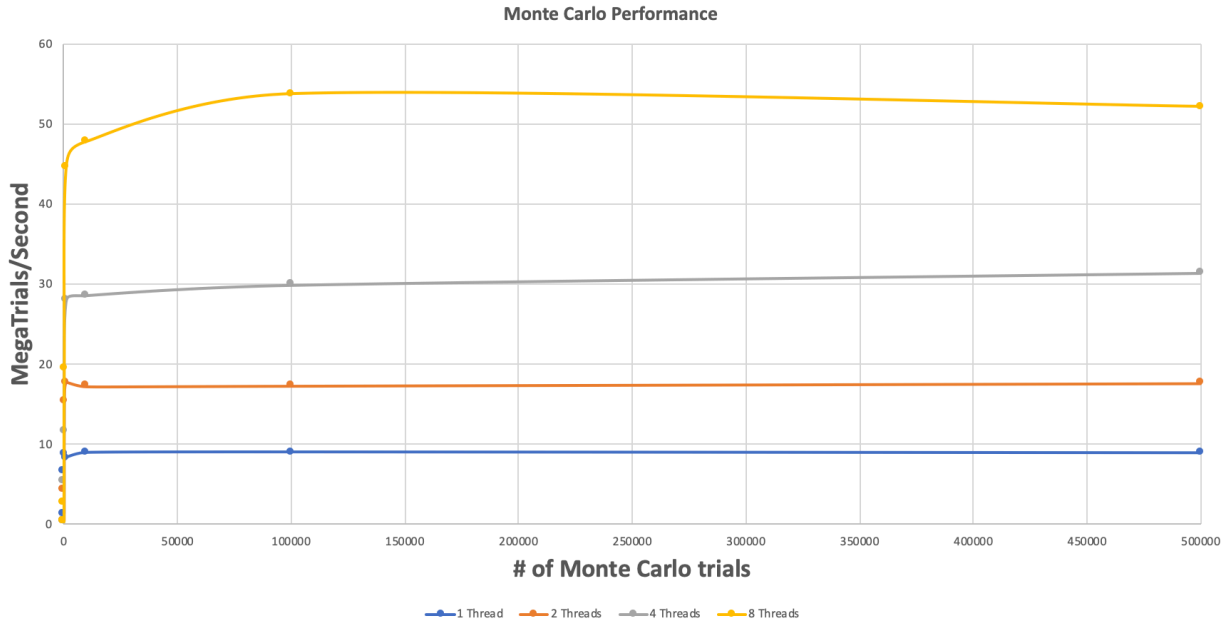

Fig. 1.2 Graph of performance vs. number of trials

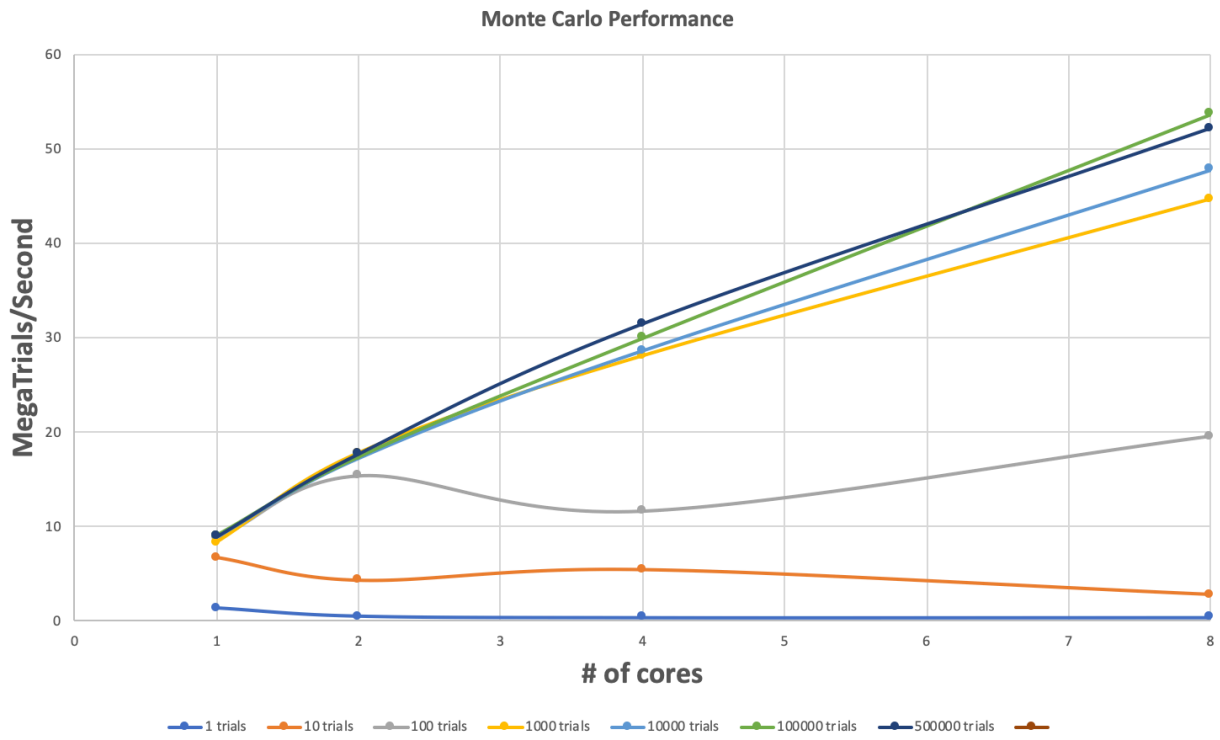

Fig. 1.3 Graph of performance vs. number of threads.

Estimate of the actual probability:

Results:

```
flip3 ~/cs575/project1 341$ csh benchmark.sh

 1 threads :        1 trials ; probability =   0.00% ; megatrials/sec =   1.35
 1 threads :       10 trials ; probability =   0.00% ; megatrials/sec =   6.69
 1 threads :      100 trials ; probability =   2.00% ; megatrials/sec =   8.76
 1 threads :     1000 trials ; probability =   5.70% ; megatrials/sec =   8.35
 1 threads :    10000 trials ; probability =   6.58% ; megatrials/sec =   8.95
 1 threads :   100000 trials ; probability =   6.48% ; megatrials/sec =   9.01
 1 threads :   500000 trials ; probability =   6.52% ; megatrials/sec =   8.90
 1 threads :  1000000 trials ; probability =   6.55% ; megatrials/sec =   8.76

 2 threads :        1 trials ; probability =   0.00% ; megatrials/sec =   0.52
 2 threads :       10 trials ; probability =  10.00% ; megatrials/sec =   4.28
 2 threads :      100 trials ; probability =   6.00% ; megatrials/sec =  15.36
 2 threads :     1000 trials ; probability =   5.40% ; megatrials/sec =  17.80
 2 threads :    10000 trials ; probability =   6.30% ; megatrials/sec =  17.27
 2 threads :   100000 trials ; probability =   6.42% ; megatrials/sec =  17.34
 2 threads :   500000 trials ; probability =   6.56% ; megatrials/sec =  17.66
 2 threads :  1000000 trials ; probability =   6.60% ; megatrials/sec =  17.69

 4 threads :        1 trials ; probability =   0.00% ; megatrials/sec =   0.36
 4 threads :       10 trials ; probability =  10.00% ; megatrials/sec =   5.40
 4 threads :      100 trials ; probability =   8.00% ; megatrials/sec =  11.66
 4 threads :     1000 trials ; probability =   6.20% ; megatrials/sec =  28.07
 4 threads :    10000 trials ; probability =   6.43% ; megatrials/sec =  28.64
 4 threads :   100000 trials ; probability =   6.67% ; megatrials/sec =  29.92
 4 threads :   500000 trials ; probability =   6.58% ; megatrials/sec =  31.42
 4 threads :  1000000 trials ; probability =   6.55% ; megatrials/sec =  33.24

 8 threads :        1 trials ; probability =   0.00% ; megatrials/sec =   0.36
 8 threads :       10 trials ; probability =   0.00% ; megatrials/sec =   2.79
 8 threads :      100 trials ; probability =   6.00% ; megatrials/sec =  19.53
 8 threads :     1000 trials ; probability =   6.80% ; megatrials/sec =  44.66
 8 threads :    10000 trials ; probability =   6.55% ; megatrials/sec =  47.74
 8 threads :   100000 trials ; probability =   6.47% ; megatrials/sec =  53.68
 8 threads :   500000 trials ; probability =   6.51% ; megatrials/sec =  52.10
 8 threads :  1000000 trials ; probability =   6.54% ; megatrials/sec =  54.25
flip3 ~/cs575/project1 342$
```

Based on the results here, choose the run with the maximum number of trials and 8 threads, the actual probability should be 6.54%.

Compute Fp:

$$\text{Speedup}_n = \frac{T_1}{T_n} = \frac{performance\ with\ 8\ threads}{performance\ with\ 1\ threads} = \frac{\frac{54.25 MegaTrials}{Sec}}{(\frac{8.76 MegaTrials}{Sec})} = 6.19$$

$$F_p = \frac{n}{n-1} \times \left(1 - \frac{1}{Speedup}\right) = \left(\frac{8}{7}\right) \times \left(1 - \frac{1}{6.19}\right) = 0.96$$