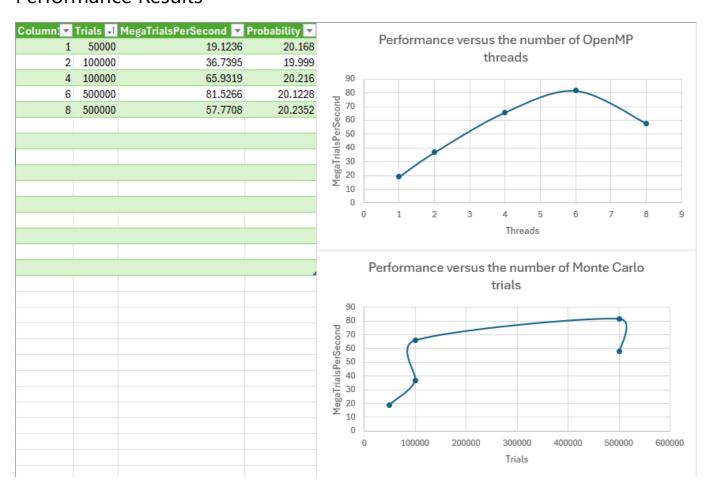# Project 1 - Monte Carlo Simulation Analysis

Probability Analysis

Based on the data with 500,000 trials, the probability of a successful hit is around 20.2%. The actual probability is around 20.25 averagin all the trials.

Performance Results

Column1	Trials	MegaTrialsPerSecond	Probability
1	50000	19.1236	20.168
2	100000	36.7395	19.999
4	100000	65.9319	20.216
6	500000	81.5266	20.1228
8	500000	57.7708	20.2352

Performance versus the number of OpenMP threads

Performance versus the number of Monte Carlo trials

Speedup Analysis

The speedup from 1 thread to 4 threads is: Speedup = 65.96 / 18.81 = 3.51

Parallel Fraction (Fp) Calculation

Using the formula: Fp = (4/3)*(1 - (1/S))

Fp = (4/3)*(1 - (1/3.51)) Fp = (4/3)*(1 - 0.284) Fp = (4/3)*(0.716) Fp = 0.953

Maximum Theoretical Speedup

Using Amdahl's Law, the maximum theoretical speedup regardless of the number of cores is: Smax = 1/(1-Fp) = 1/(1-0.953) = 1/0.047 = 21.28

The maximum speedup we could achieve is approximately 21.28 times 1 thread performance.