Final

CE 3377.001

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Problem 1

Bash script:

# points	Time (s)	Est. value	Deviation	% error
10	0.145	3.6	0.45841	14.59156
100	1.137	3.04	0.10159	3.23379
1000	10.509	3.188	0.04641	1.47719
10000	103.467	3.1544	0.01281	0.40767

C++:

# points	Time (s)	Est. value	Deviation	% error
10	0.006	2.4	0.74159	23.60563
100	0.006	3.28	0.12841	4.40564
1000	0.006	3.084	0.05759	1.83323
10000	0.006	3.13280	0.00879	0.27988

1.1

I was able to run 6256 points using a Bash script and 4,289,247,961 points using C++.

1.2

The C++ code ran much faster than the Bash script. So much faster to the point where the time it took for the C++ code to run 10 points wasn't any faster than when it ran 10000 points, which means that the bottleneck for the speed of the C++ code might have been the standard output calls.

This is because C++ is a compiled language and Bash is an interpreted language. Compiled languages always run faster than interpreted languages.

1.3

The Bash script was generally more accurate until the number of points ran reached 10000, when the C++ code was more accurate. This can be attributed to the quality of the random number generators, since two different kinds were used for both the Bash script and C++ code. Not all random number generators are the same.