

Spring 2019: Advanced Topics in Numerical Analysis:
High Performance Computing Assignment 3
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1. **Approximating Special Functions Using Taylor Series & Vectorization.** The processor I used for computing is: Intel(R) Core(TM) i5-7287U CPU @ 3.30GHz, 2 Cores, 4 Threads, Max Turbo Frequency 3.7GHz. I've improved the accuracy to 12-digits for any one vectorized version by adding more terms to the Taylor series expansion. In the function `sin4_intrin()`, I used AVX intrinsics. The results are:

Reference time: 0.2831

Taylor time: 1.6717; Error: 6.927903e-12;

Intrin time: 0.0020; Error: 6.927903e-12;

Vector time: 0.0019; Error: 6.927903e-12;

2. **Parallel Scan in OpenMP.** The processor I used for computing is: Intel(R) Core(TM) i5-7287U CPU @ 3.30GHz, 2 Cores, 4 Threads, Max Turbo Frequency 3.7GHz. The time for various array size and threads are:

Scan Size	1 Thread	2 Threads	3 Threads	4 Threads
5×10^7	0.186995	0.129221	0.116997	0.109448
1×10^8	0.403013	0.272953	0.235018	0.219358
2×10^8	0.774955	0.514368	0.469024	0.425384