Q8 Readme

The program for Question 8 of the prelim is called trapezoid. Trapezoid utilizes code for computing trapezoidal rule integration that I previously used in Scientific Programming Assignment 1 for the Fall 2016 semester (the function I devised for utilizing the trapezoidal rule is relatively unchanged.)

MPI is implemented to integrate the function outlined by the question using the clusters housed in the Dirac Science library. The subintervals of the integration are equal to the number of processors one designates for the computation. When the trapezoid program is used to integrate the function over 10 processors it computes the following results:

-bash-4.2$ mpirun -np 10 trapezoid

Area found in processor 7 = 77.2812

Area found in processor 3 = 43.2913

Area found in processor 9 = 31.2763

Area found in processor 2 = 26.0438

Area found in processor 5 = 73.2862

Area found in processor 1 = 11.2963

Area found in processor 8 = 62.0288

Area found in processor 6 = 80.0338

Area found in processor 4 = 60.0387

Area found in processor 0 = 2.04875

Trapezoidal Rule Total Area = 466.625

The function is split into segments and then sent numerically to each processor. The clusters do not necessarily finish their computations in numerical order. Using the plot of the function outlined in the question, one can see how the area slowly rises from processor 0 to processor 8 the area covered by each interval increases, only to decrease in processor 9. This roughly matches the plot of the outlined function. The total area calculated using 10 processors is 466.625. If more processors were used to integrate the function the calculated area would be more precise.