ME 766: HW1

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Q1-

following files are attached that contains code:

trapezoidal_serial.c
trapezoidal_parallel.c
montecarlo_serial.c
montecarlo_parallel.c

Q2-

Convergence study

i) Trapezoidal Serial

```
kiran@kiran-VirtualBox:~/ME766$ gcc trapezoidal_serial.c -lm
kiran@kiran-VirtualBox:~/ME766$ ./a.out
Sample Size     Area            Absolute Error  Avg. Time
2               0.785398        1.214602        0.000009
5               1.749107        0.250893        0.000003
10              1.934983        0.065017        0.000001
20              1.983600        0.016400        0.000002
50              1.997369        0.002631        0.000003
100             1.999342        0.000658        0.000005
200             1.999836        0.000164        0.000011
500             1.999974        0.000026        0.000017
1000            1.999993        0.000007        0.000034
10000           2.000000        0.000000        0.000356
```

ii) MonteCarlo Serial

```
kiran@kiran-VirtualBox:~/ME766$ gcc montecarlo_serial.c -lm
kiran@kiran-VirtualBox:~/ME766$ ./a.out
Sample Size     Area            Absolute Error  Avg. Time
5               1.884955        0.115045        0.000016
10              2.513274        0.513274        0.000003
50              1.822123        0.177877        0.000007
100             1.790707        0.209293        0.000012
500             2.035752        0.035752        0.000066
1000            1.991769        0.008231        0.000091
10000           2.007477        0.007477        0.000913
100000          2.001194        0.001194        0.008017
1000000         2.000013        0.000013        0.074062
5000000         2.000159        0.000159        0.359304
```

Q3-

i) Trapezoidal parallel

```
kiran@kiran-VirtualBox:~/ME766$ ./a.out
Sample size =   1000000

#Threads        1st run         2nd run         3rd run         4th run         5th run         Avg. Time
2               0.120069        0.083835        0.088194        0.086423        0.088477        0.093400
4               0.120002        0.089005        0.082337        0.094280        0.094900        0.096105
6               0.130848        0.084779        0.098099        0.072238        0.068921        0.090977
8               0.104462        0.068766        0.071490        0.069566        0.072735        0.077404
```

ii) Monte Carlo

```
kiran@kiran-VirtualBox:~/ME766$ ./a.out
Sample size =   100000000

#Threads        1st run         2nd run         3rd run         4th run         5th run         Avg. Time
2               0.000066        0.000018        0.000017        0.000017        0.000017        0.000027
4               0.000104        0.000048        0.000047        0.000047        0.000047        0.000059
6               0.000133        0.000076        0.000076        0.000086        0.000130        0.000100
8               0.000152        0.000105        0.000105        0.000105        0.000121        0.000117
```

Q4-

for n = 1000000
Trapezoidal serial code takes much time than parallel code. Also in parallel openmp code thread = 8 taakes lesser time than (thread = 2,4,6).

for n = 100000000
Montecarlo serial code also takes much time than parallel code. Here thread = 2 is taking lesser time other threads also average time is very less than serial here.