Introduction to Parallel Scientific Computing

Homework 5

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ME21BTECH11028

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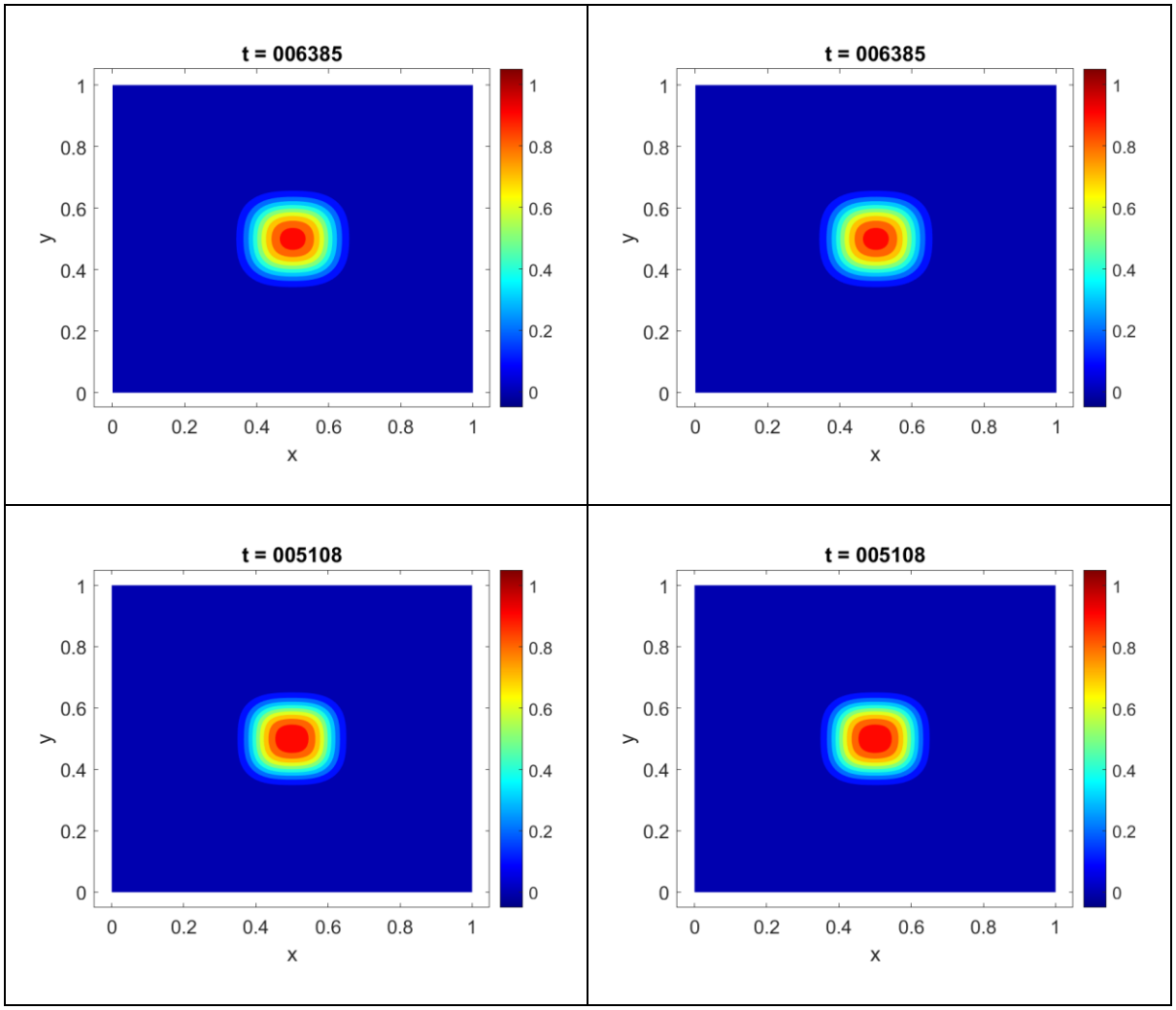
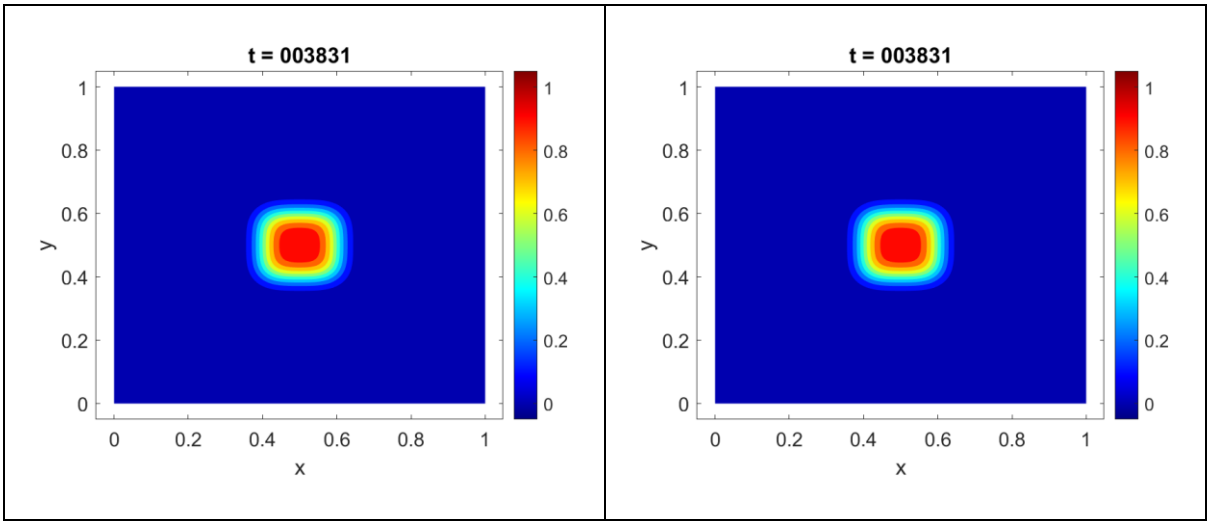
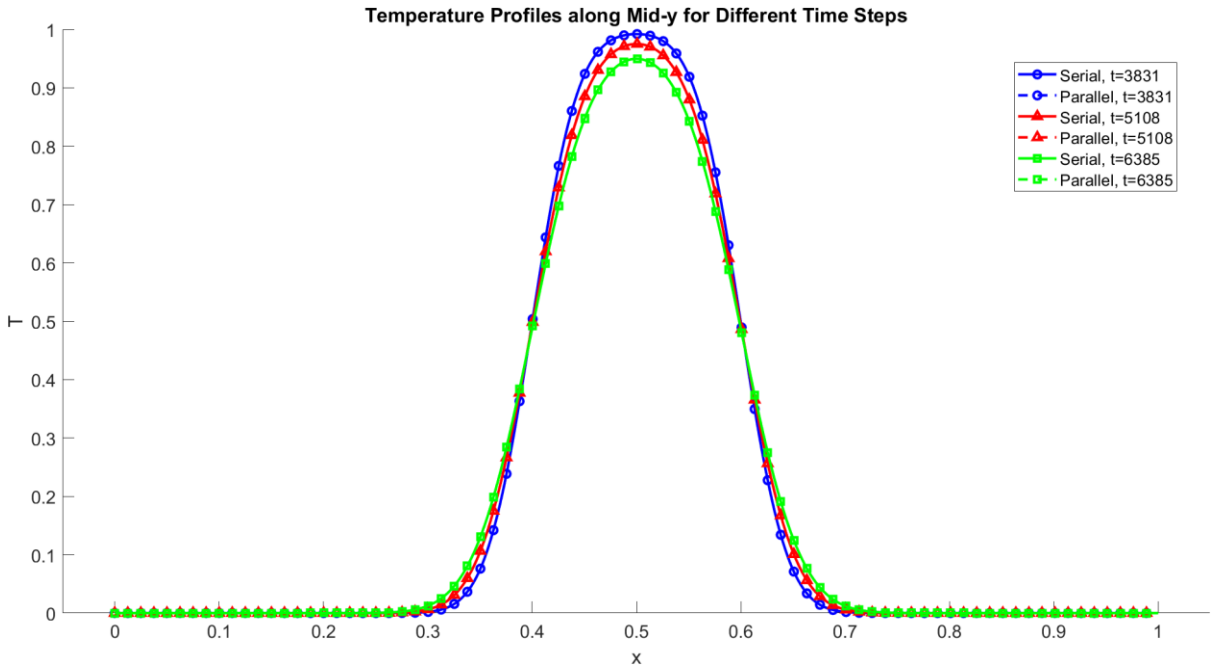
Q1 - a

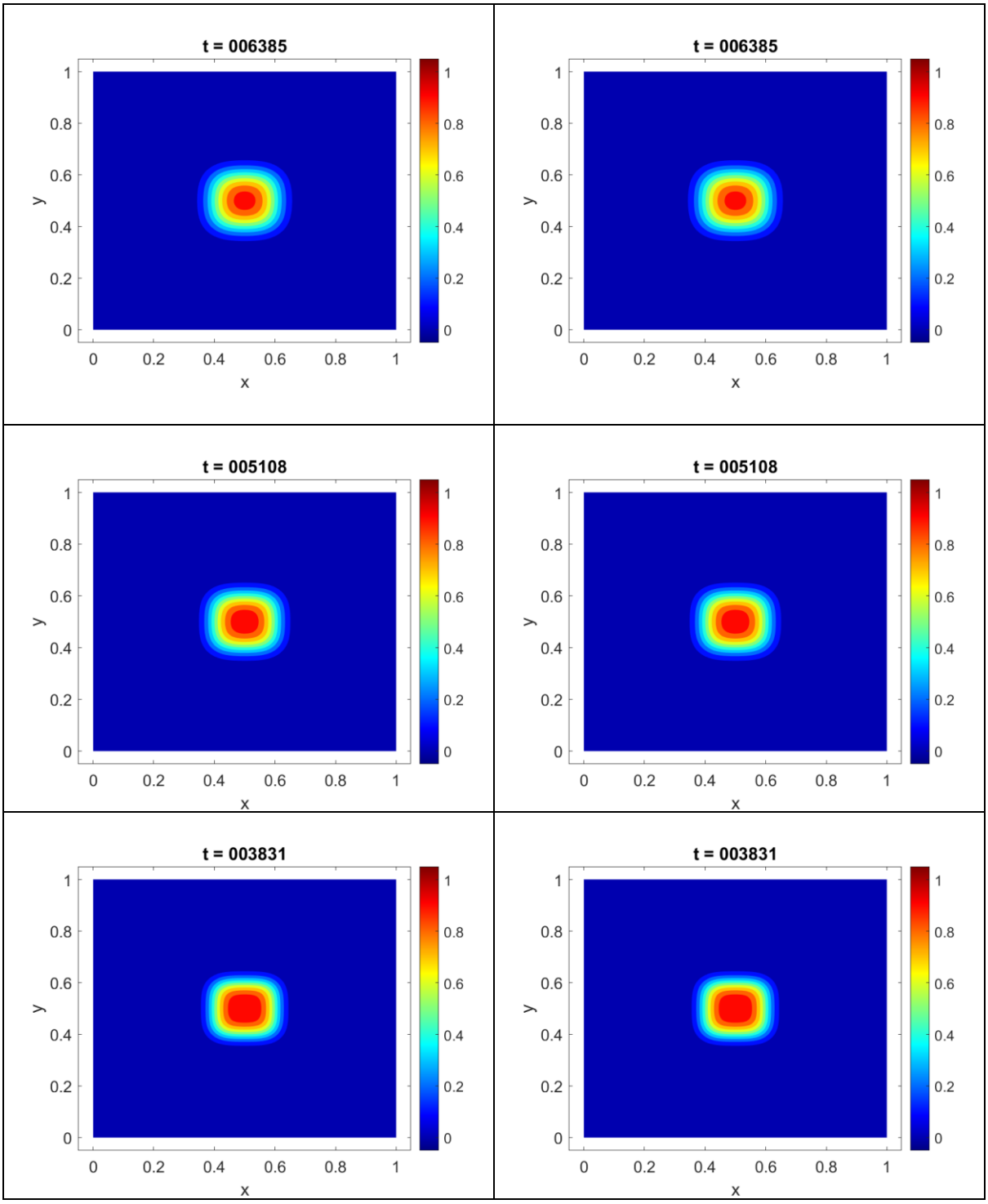
For Parallel, p=2x2 (on left) and Serial (on right):

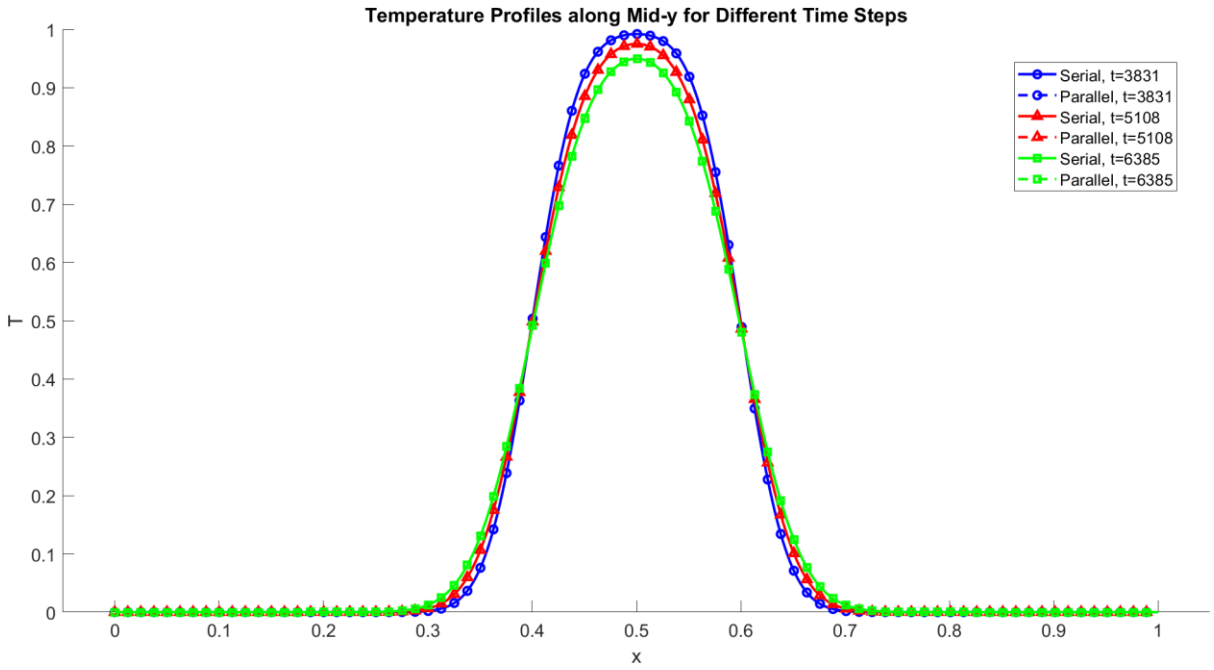



t = 003831
y
x
t = 003831
y
x

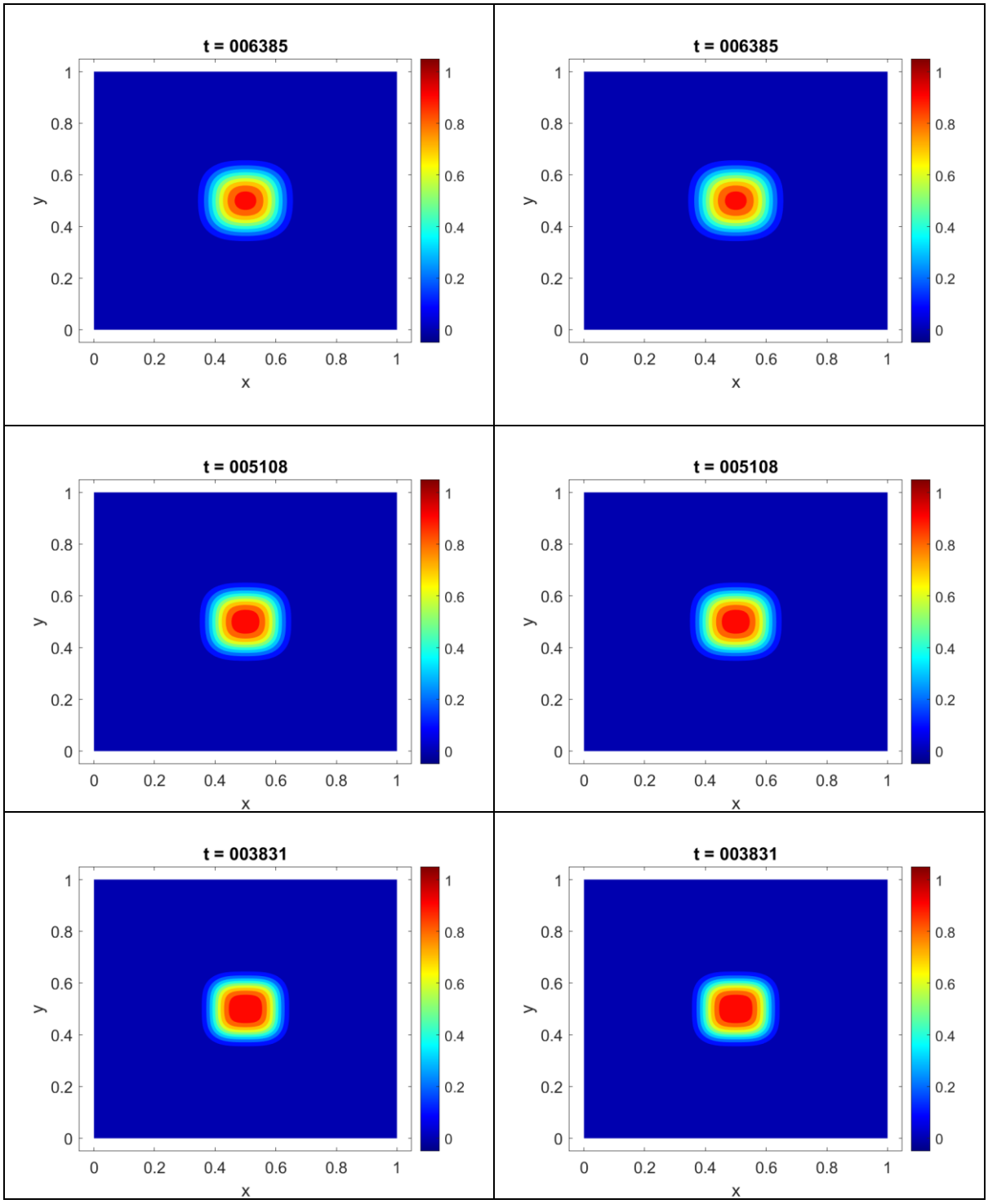

Temperature Profiles along Mid-y for Different Time Steps
T
x
Serial, t=3831
Parallel, t=3831
Serial, t=5108
Parallel, t=5108
Serial, t=6385
Parallel, t=6385

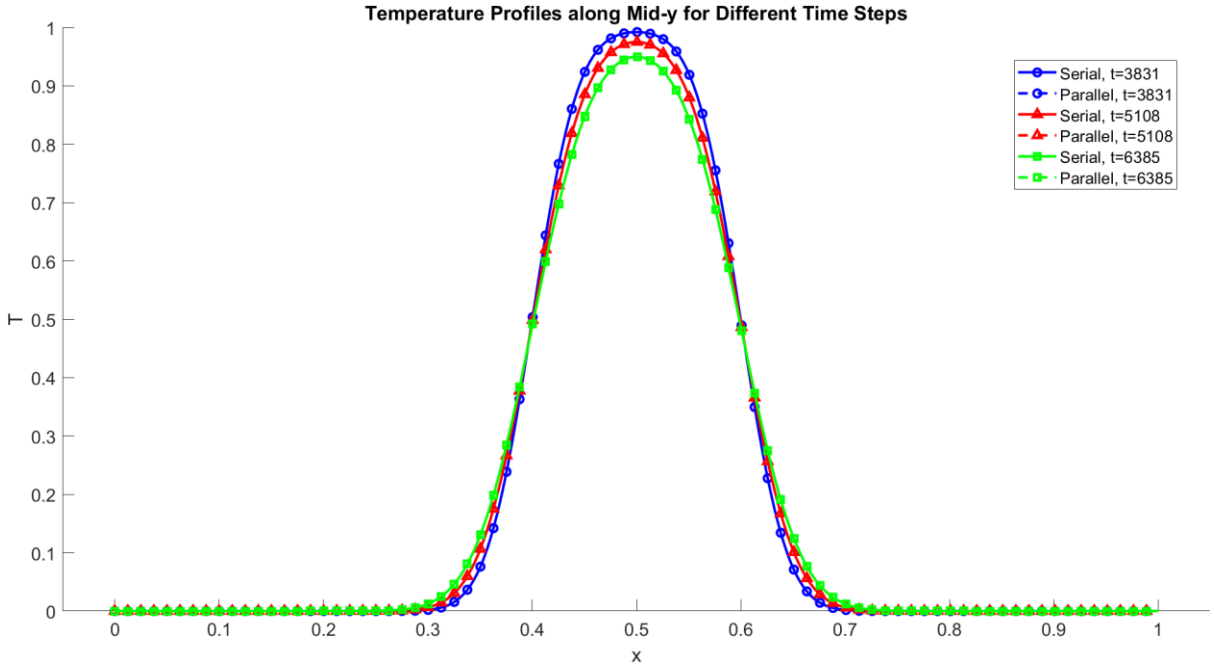
For Parallel, p=2x2 (on left) and Serial (on right):




Temperature Profiles along Mid-y for Different Time Steps
Serial, t=3831
Parallel, t=3831
Serial, t=5108
Parallel, t=5108
Serial, t=6385
Parallel, t=6385
T
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

For Parallel, p=4x4 (on left) and Serial (on right):




Temperature Profiles along Mid-y for Different Time Steps
Serial, t=3831
Parallel, t=3831
Serial, t=5108
Parallel, t=5108
Serial, t=6385
Parallel, t=6385
T
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

Q1 – b

The tabulation for the difference between serial and parallel at end of 10-timesteps:

Type	Value
Maximum Difference	0.00000000000000000000e + 00
Minimum Difference	0.00000000000000000000e + 00
Average Difference	0.00000000000000000000e + 00

For all processor distribution: p=2x2, p=2x4 and p=4x4, same result is observed. This shows that the difference is below machine precision.

Q1 – c

The time taken for serial and parallel run per time step:

Processor distribution	Time Taken per time step (s)
P = 2x2	0.002286
P = 2x4	0.001678
P = 4x4	0.000962
Serial	0.005592