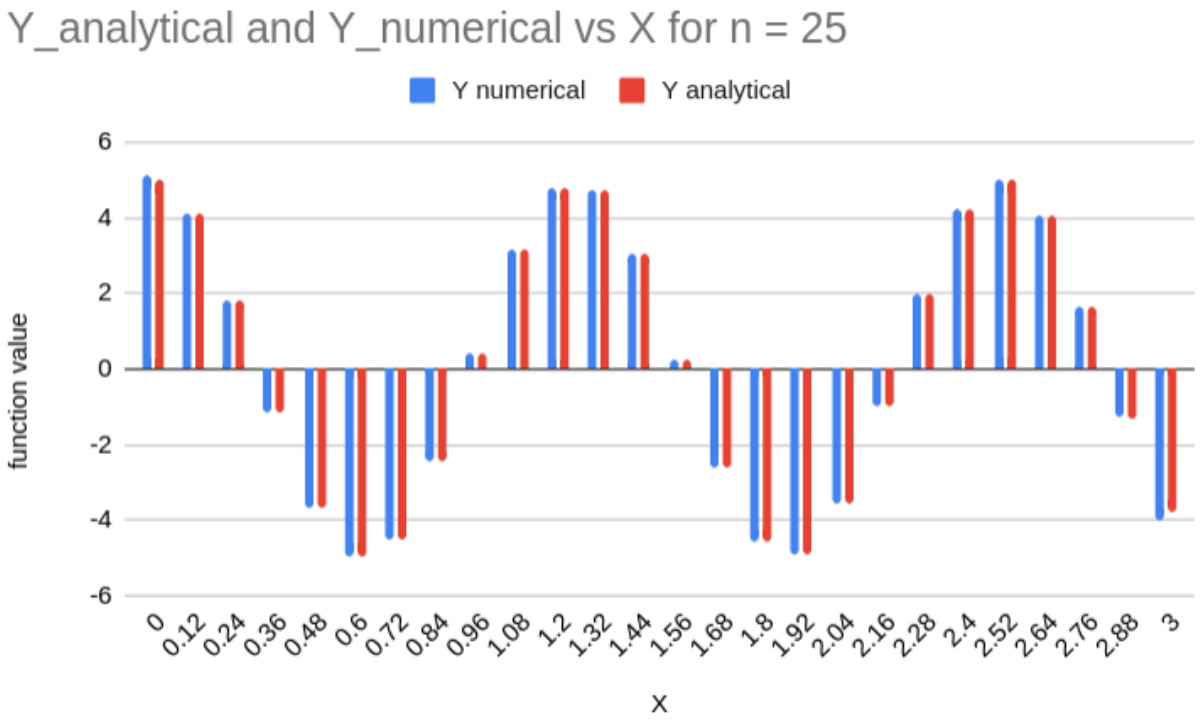
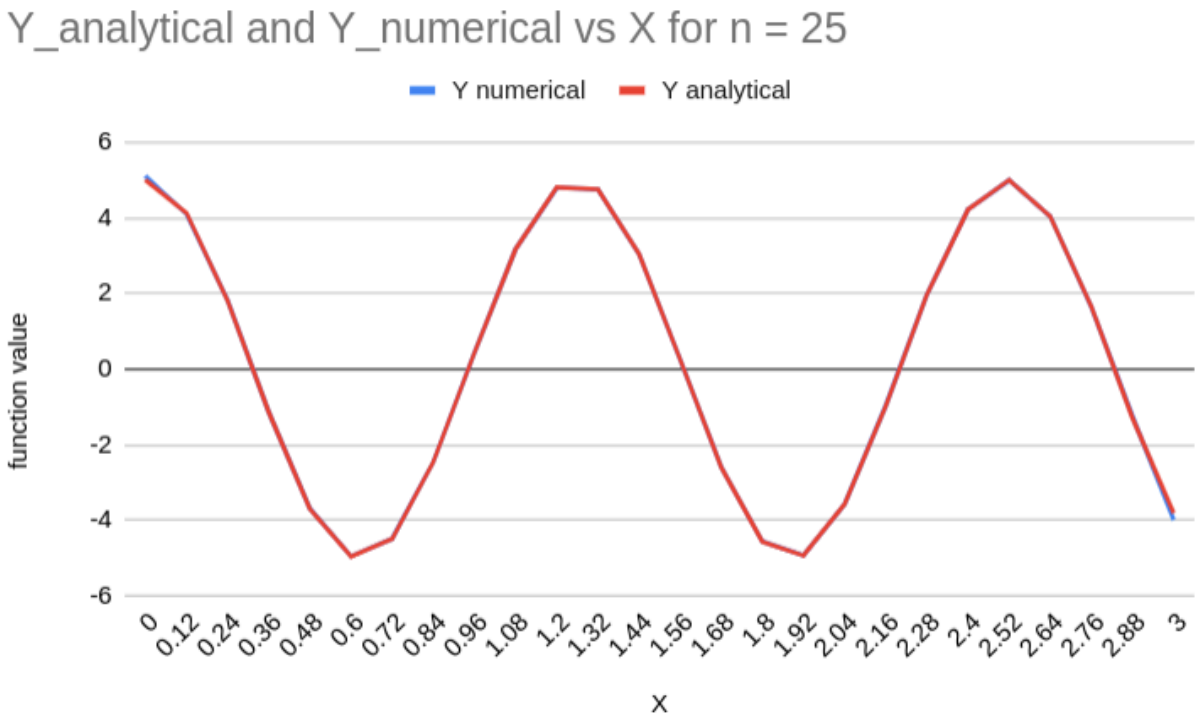
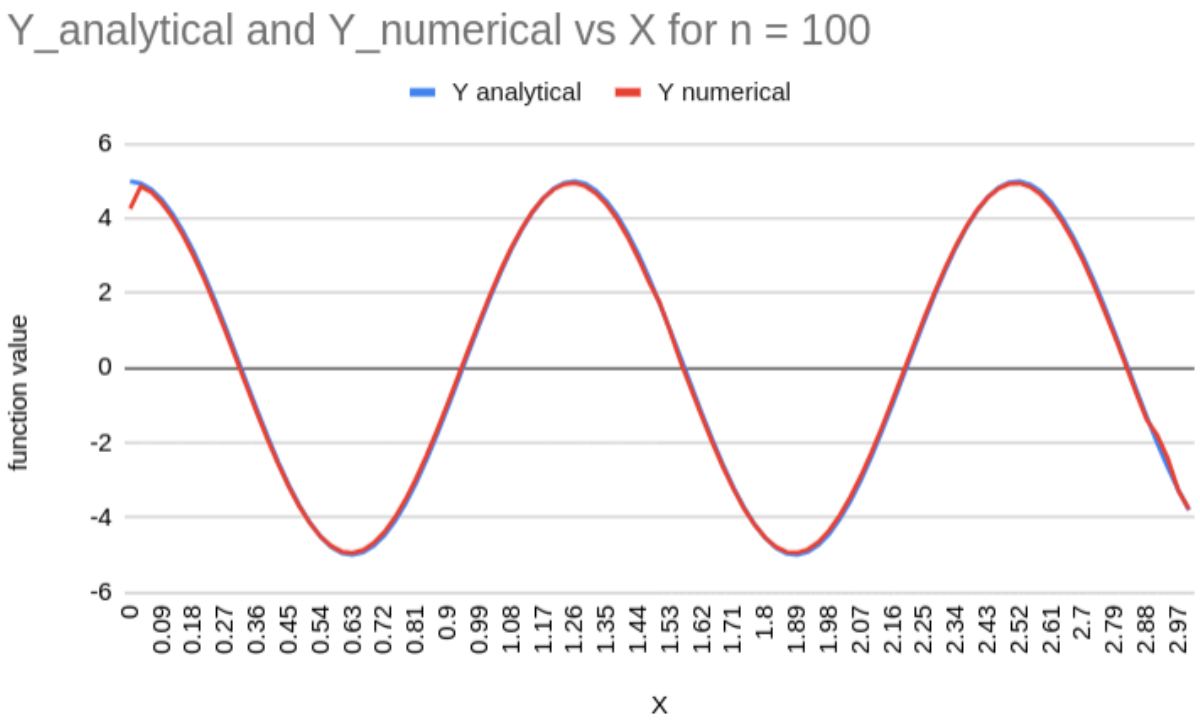
Q2a.

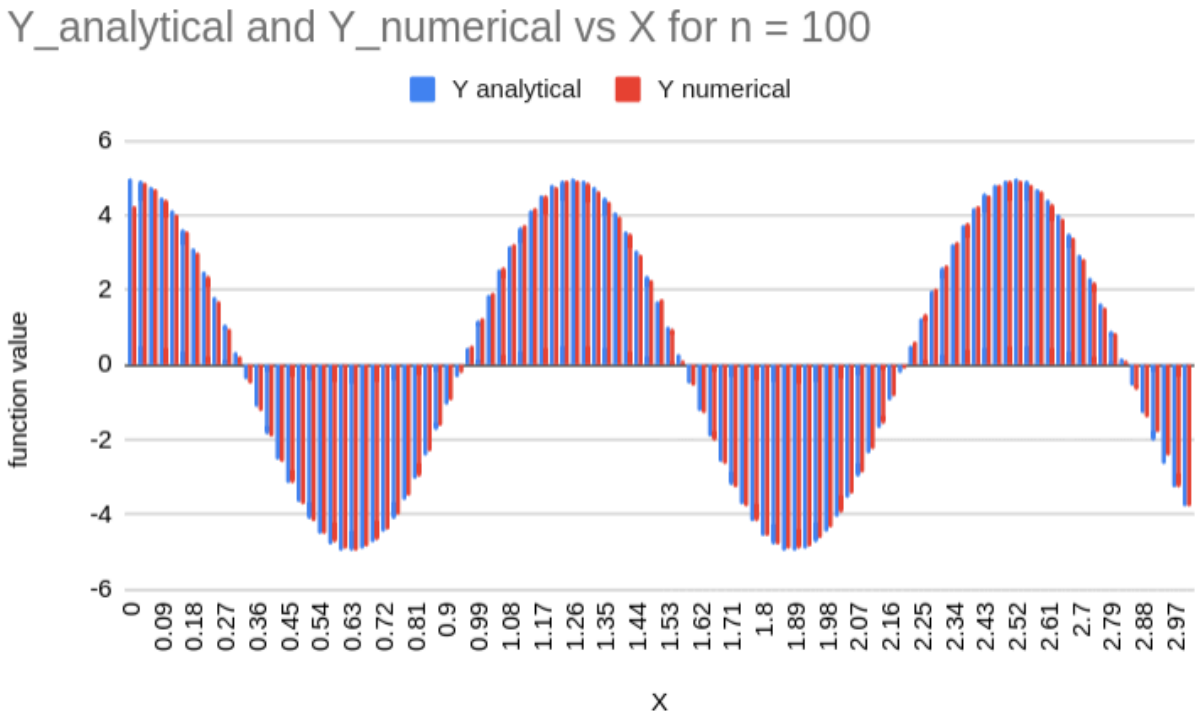


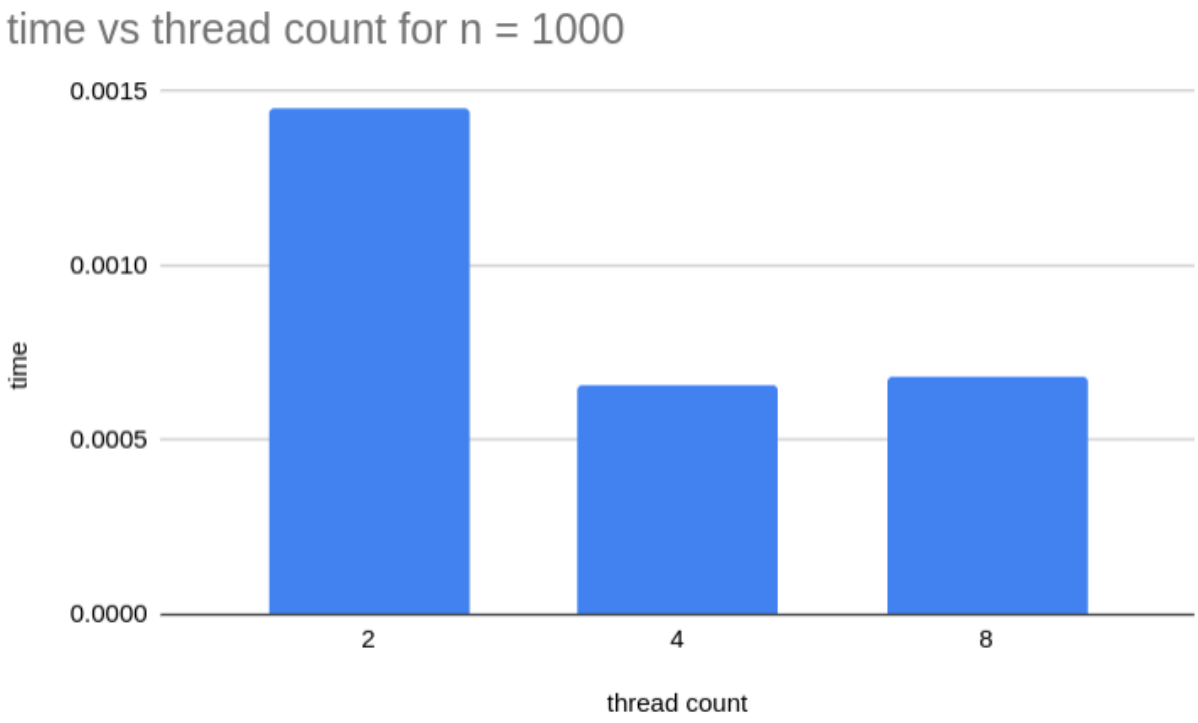


As Y_analytical and Y_numerical values are almost identical both plots are overlapping.

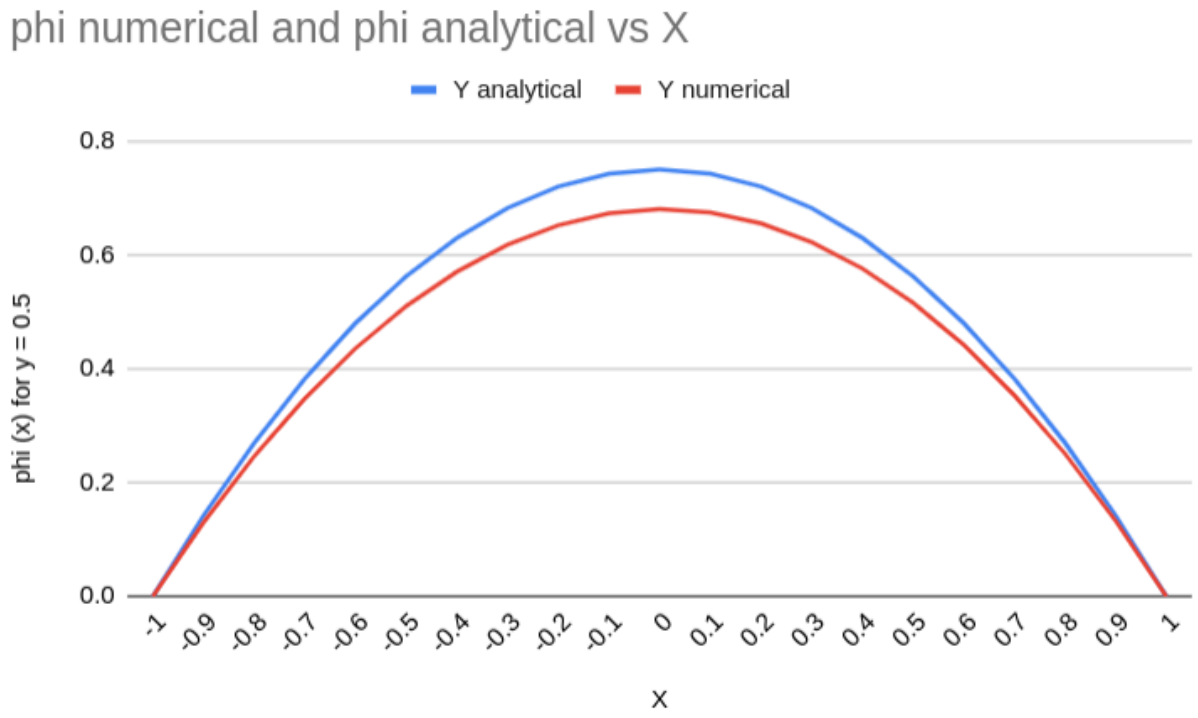
Q2b.


Y_analytical and Y_numerical vs X for n = 100
Y analytical
Y numerical
function value
6
4
2
0
-2
-4
-6
0
0.09
0.18
0.27
0.36
0.45
0.54
0.63
0.72
0.81
0.9
0.99
1.08
1.17
1.26
1.35
1.44
1.53
1.62
1.71
1.8
1.89
1.98
2.07
2.16
2.25
2.34
2.43
2.52
2.61
2.7
2.79
2.88
2.97
X

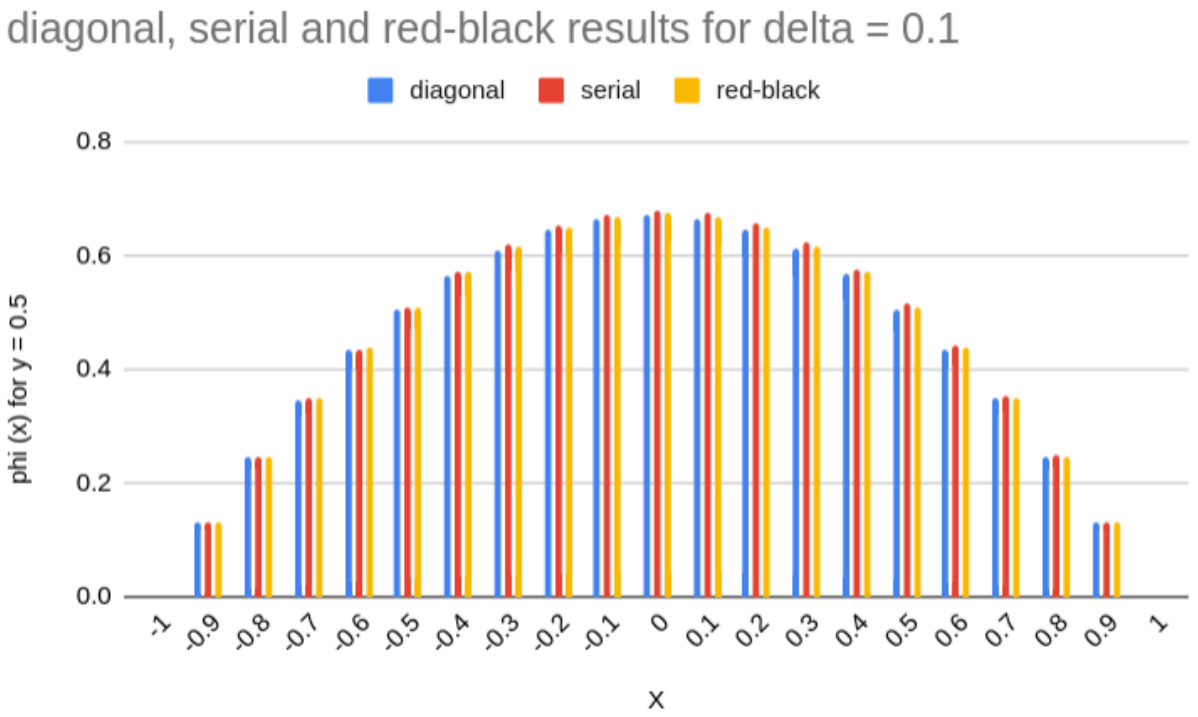

Y_analytical and Y_numerical vs X for n = 100
Y analytical
Y numerical
function value
6
4
2
0
-2
-4
-6
0
0.09
0.18
0.27
0.36
0.45
0.54
0.63
0.72
0.81
0.9
0.99
1.08
1.17
1.26
1.35
1.44
1.53
1.62
1.71
1.8
1.89
1.98
2.07
2.16
2.25
2.34
2.43
2.52
2.61
2.7
2.79
2.88
2.97
X

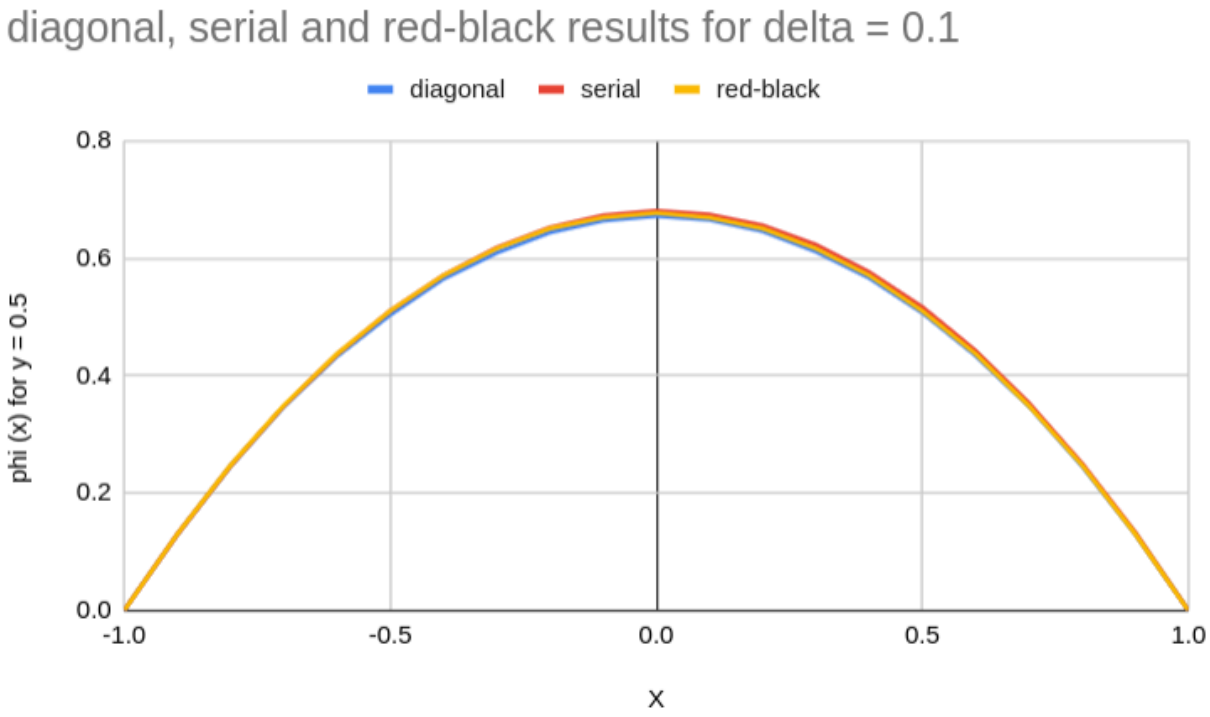


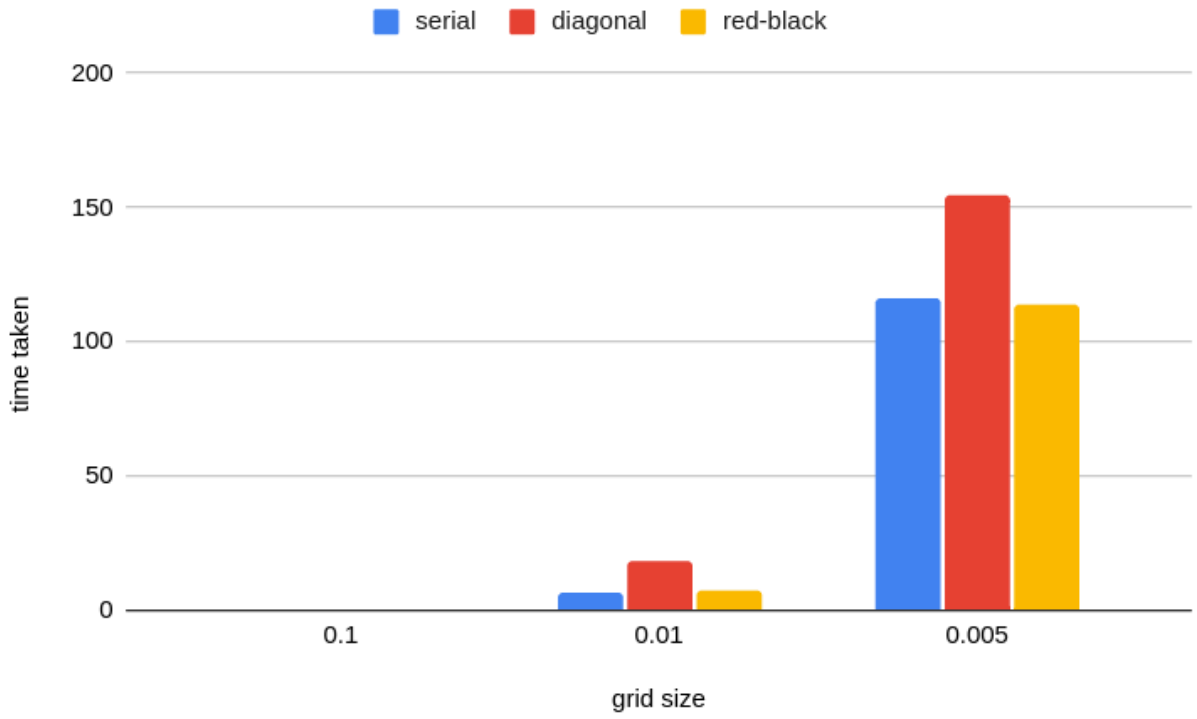
Q3a.
Serial Gauss Seidel program for delta = 0.1 has taken 94 iterations



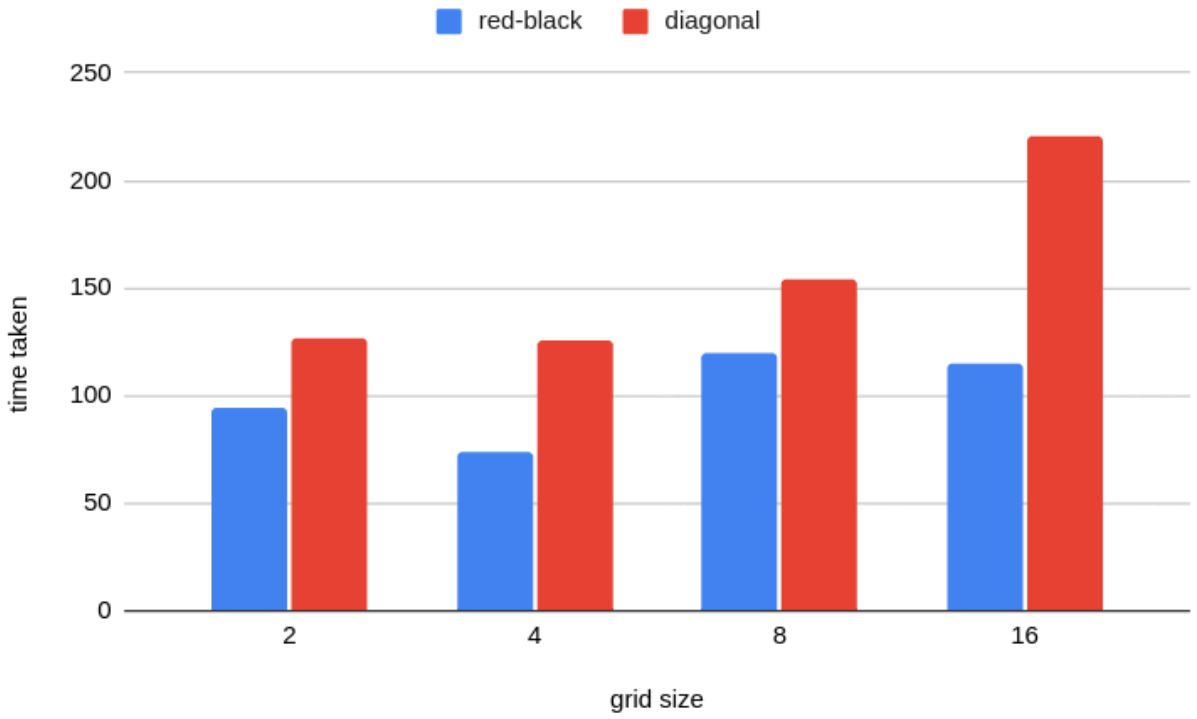
Q3c.


diagonal, serial and red-black results for delta = 0.1
diagonal
serial
red-black
0.8
0.6
0.4
0.2
0.0
phi (x) for y = 0.5
-1
-0.9
-0.8
-0.7
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
X


diagonal, serial and red-black results for delta = 0.1
diagonal
serial
red-black
0.8
0.6
0.4
0.2
0.0
phi (x) for y = 0.5
-1.0
-0.5
0.0
0.5
1.0
X



Red-Black coloring approach has given the fastest results out of the three.



Red-Black coloring is the best approach with p = 4 threads