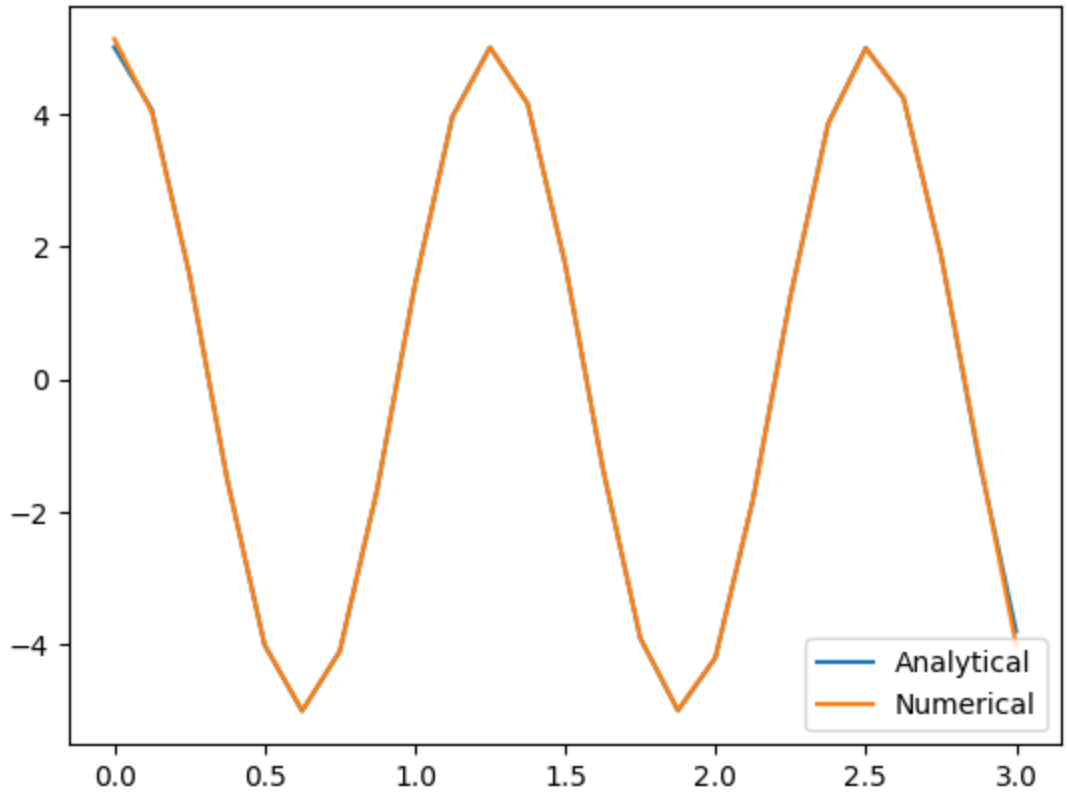
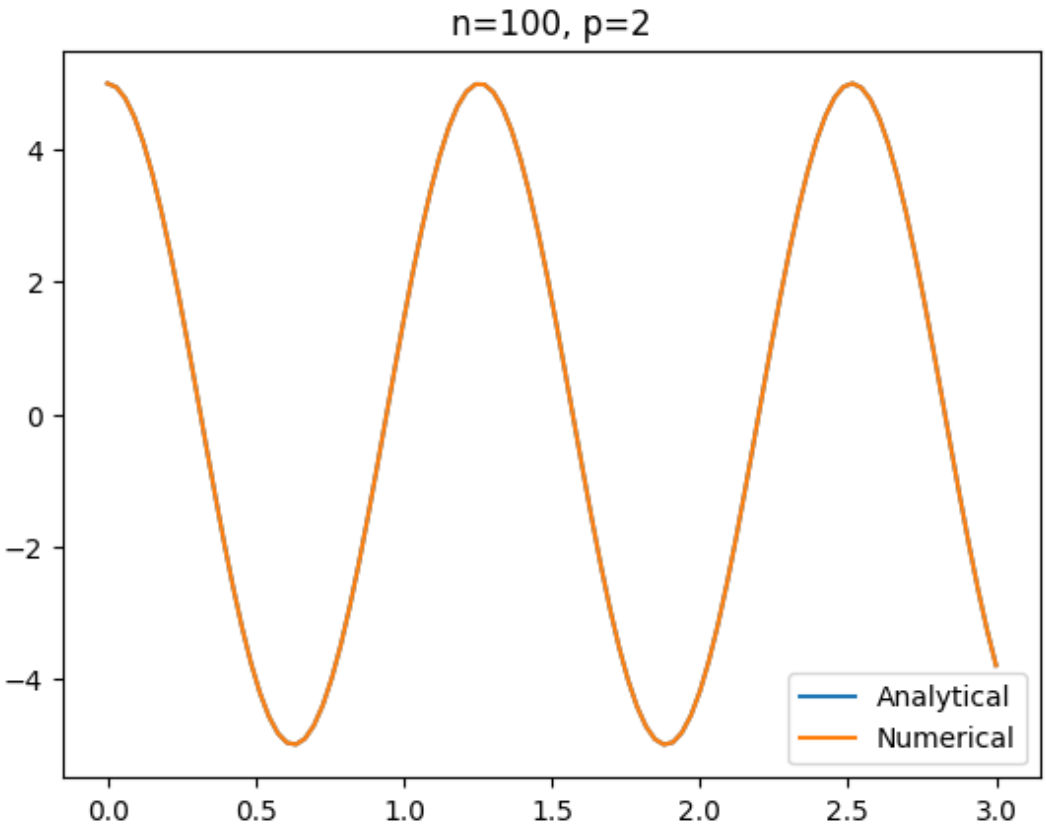
Assignment 1

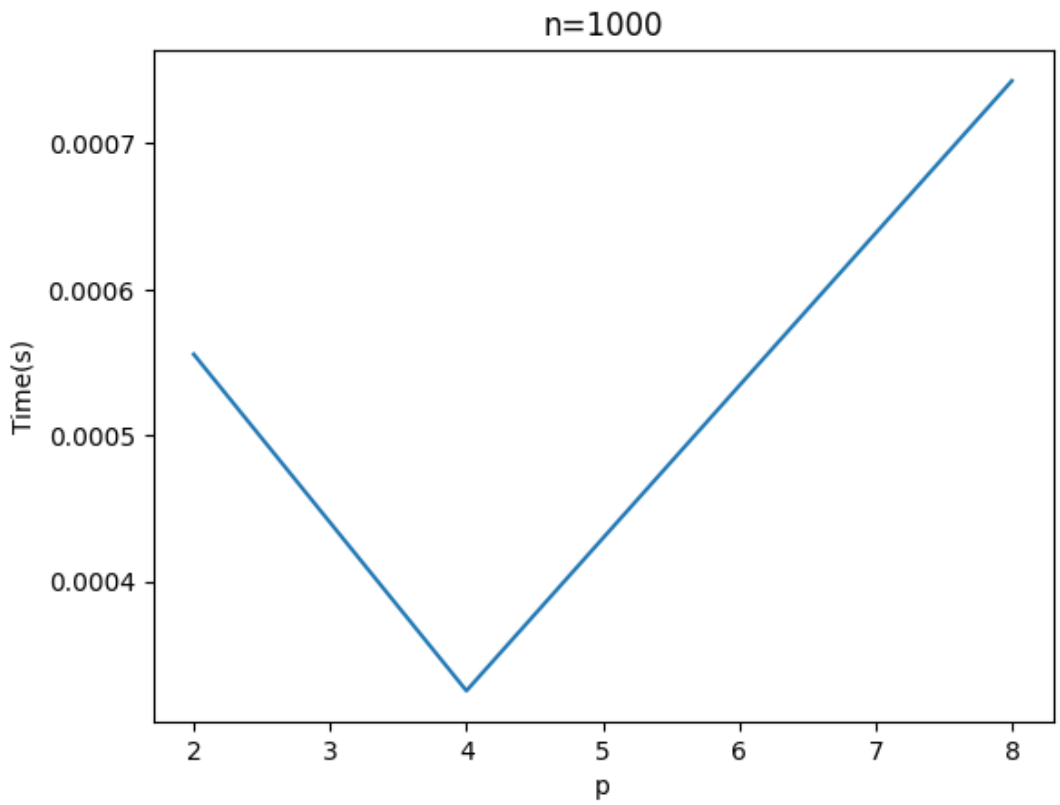
1. Submitted as separate file
2.
    a. Plot of analytical solution and the numerical solution obtained for n=25 using LU-Decomposition



    b. Recursive Doubling
        i. Plot of analytical solution and the numerical solution for n=100 and number of threads p=2



ii. Plot of time-taken by the solver for n=1000 for number of threads p=2,4,8

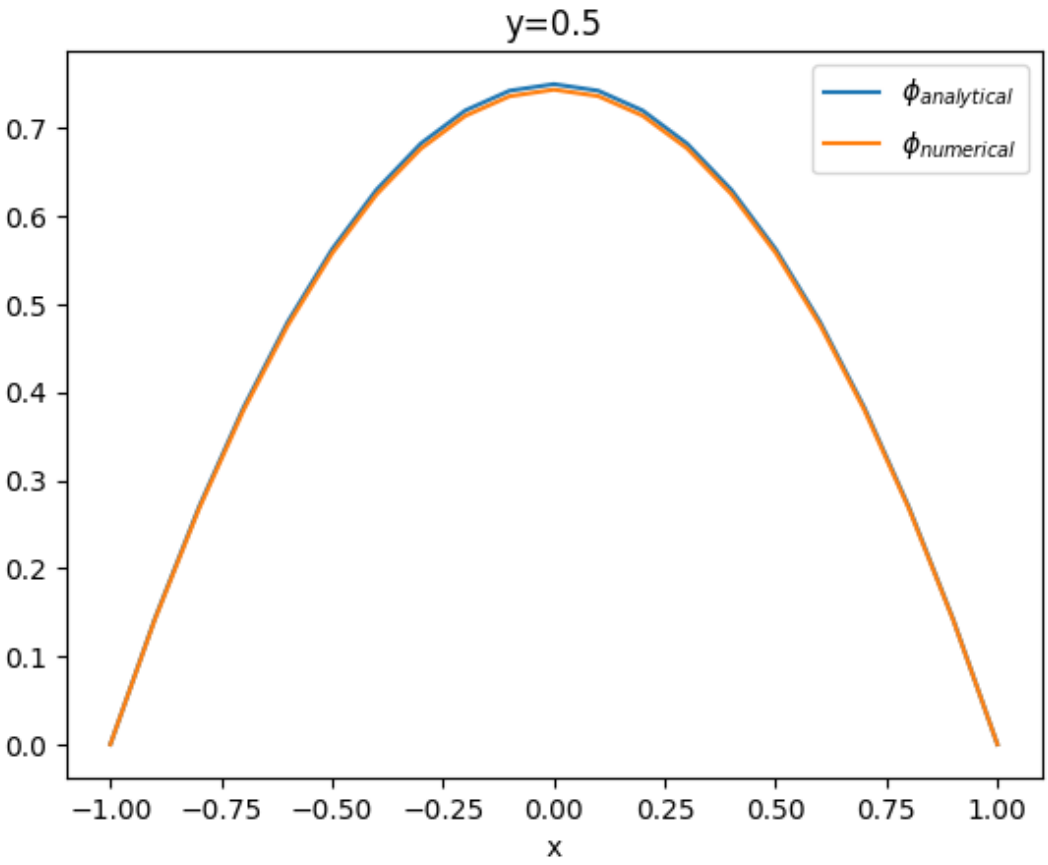


3.

a. number of iterations required to bring the numerical solution to within 1% of the exact solution

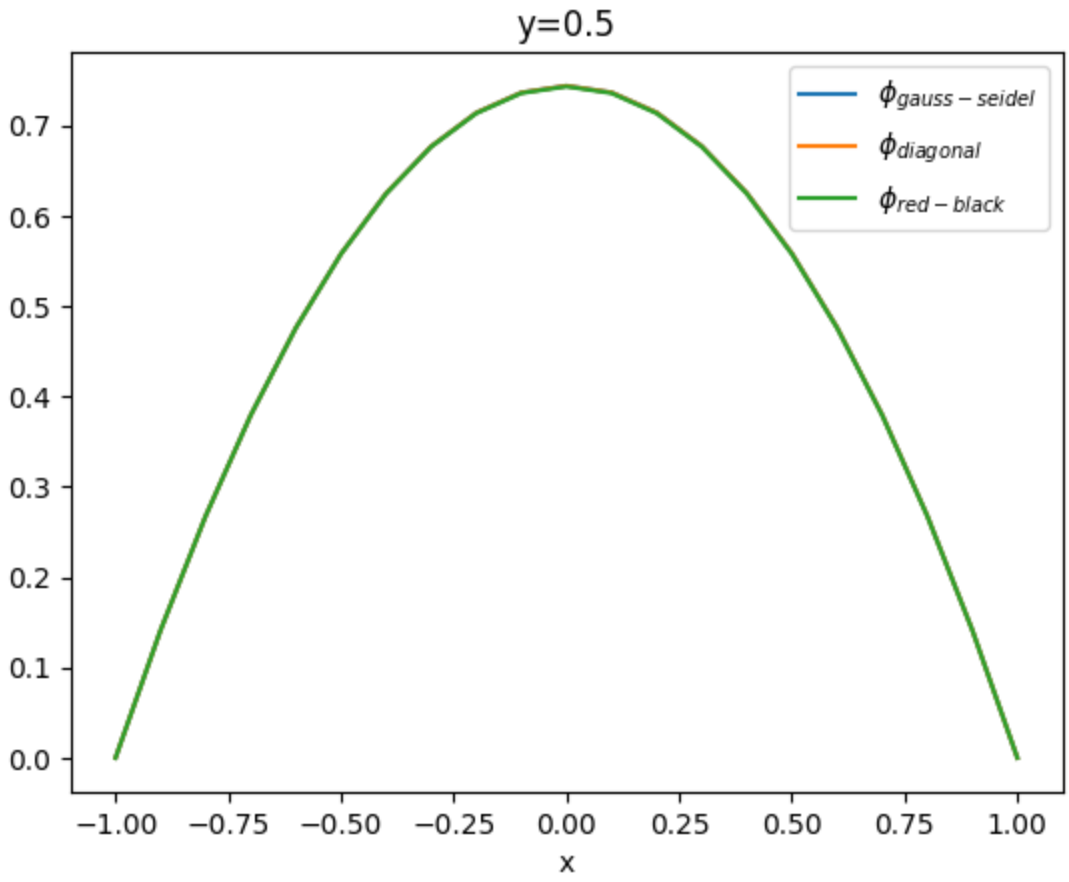
   i. The number of iterations required to bring the numerical solution to within 1% of actual solution = 191

   ii. Plot of numerical and analytical solution of ϕ vs x for $y = 0.5$

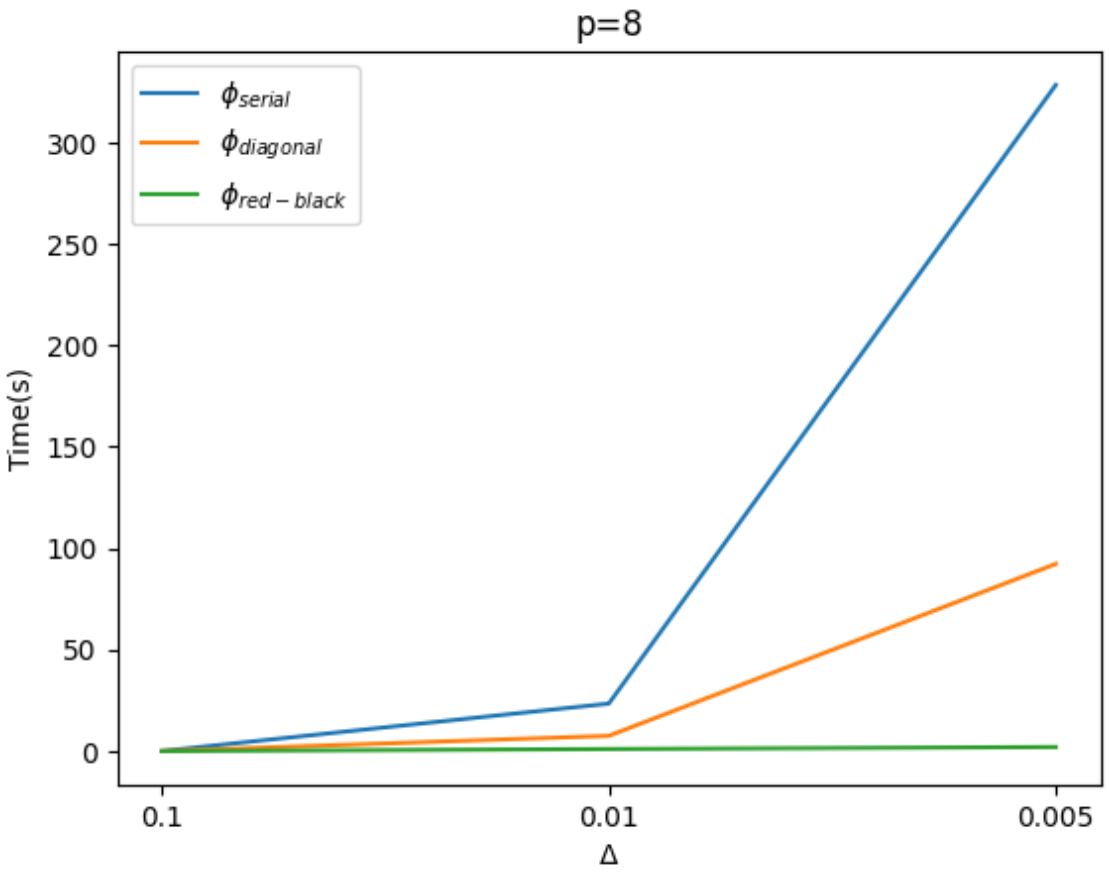


b. <code>

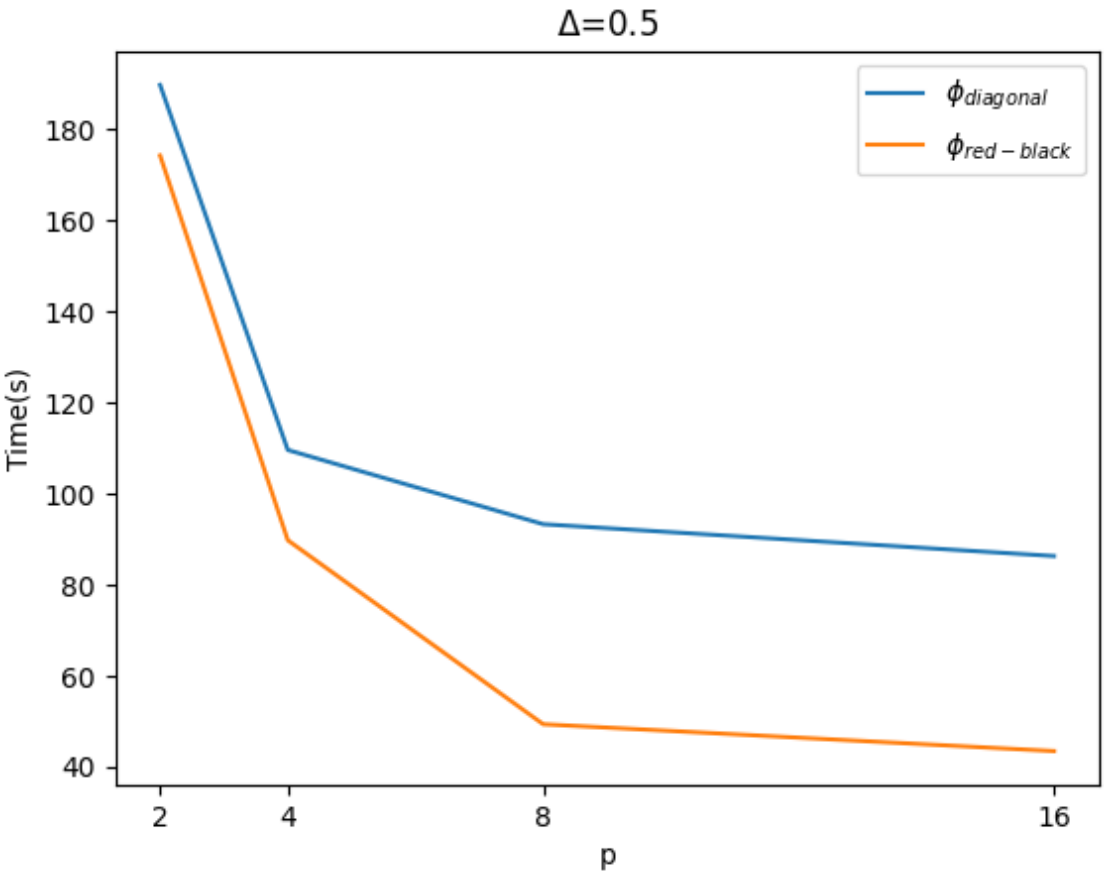
c. Verifying that parallel program gives same result as the serial program for $\Delta = 0.1$



There is an improvement in performance when using parallel methods than when running the program in a serial method. Red-Black approach is significantly better than Diagonal approach and Serial Approach



d. Red-Black approach is better than Diagonal approach


Δ=0.5
$\phi_{diagonal}$
$\phi_{red-black}$
Time(s)
180
160
140
120
100
80
60
40
2
4
8
16
p