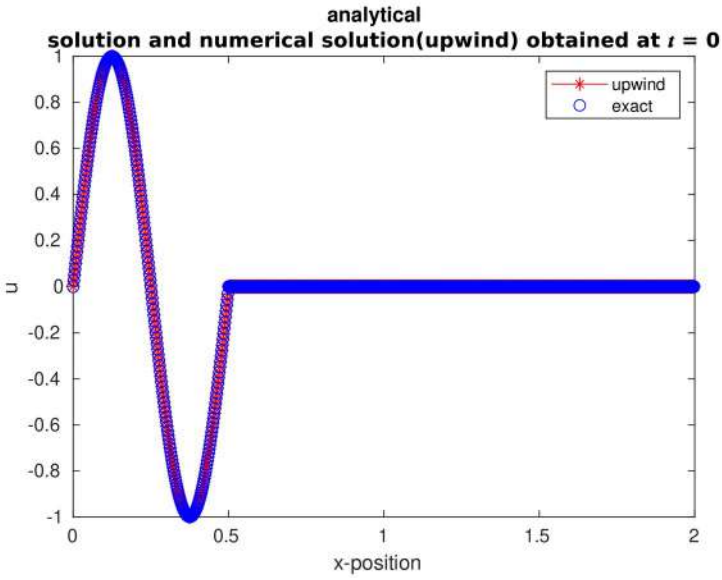
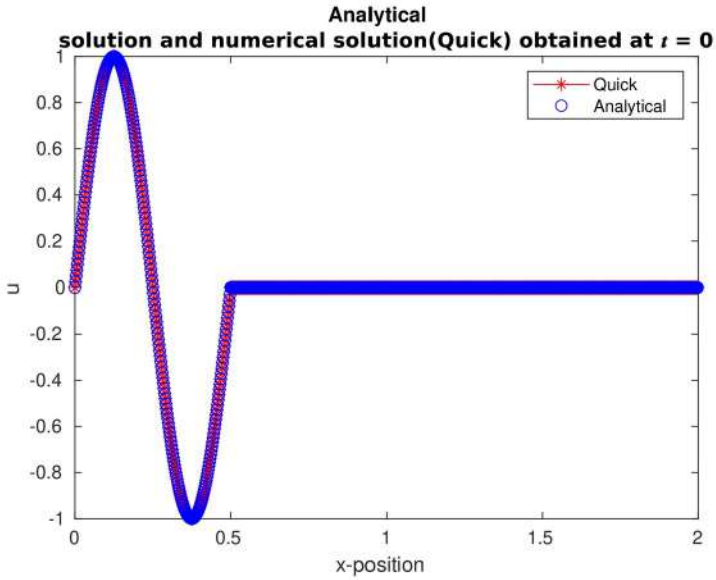
ASSIGNMENT-2
PARALLEL SCIENTIFIC COMPUTING(ID5130)
PEDDI HARISHTEJA(AM23S018)

1)
a) serial
i)t=0

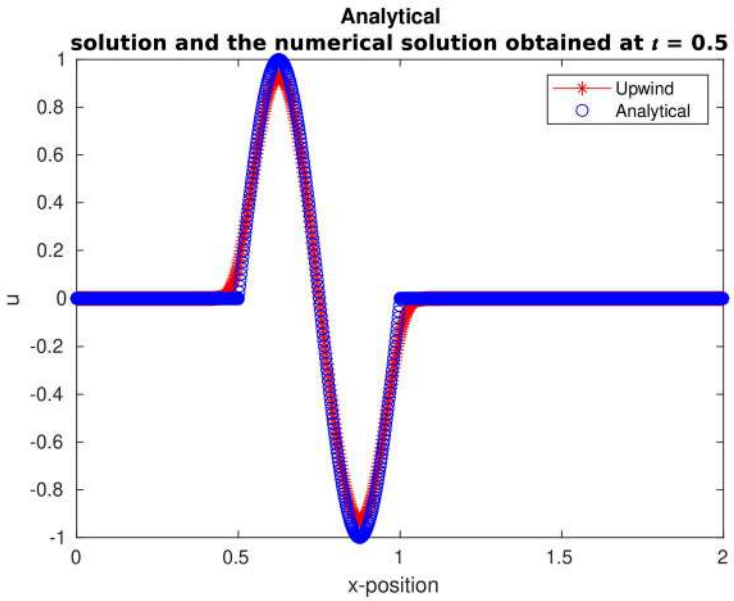
UPWIND ***Quick***

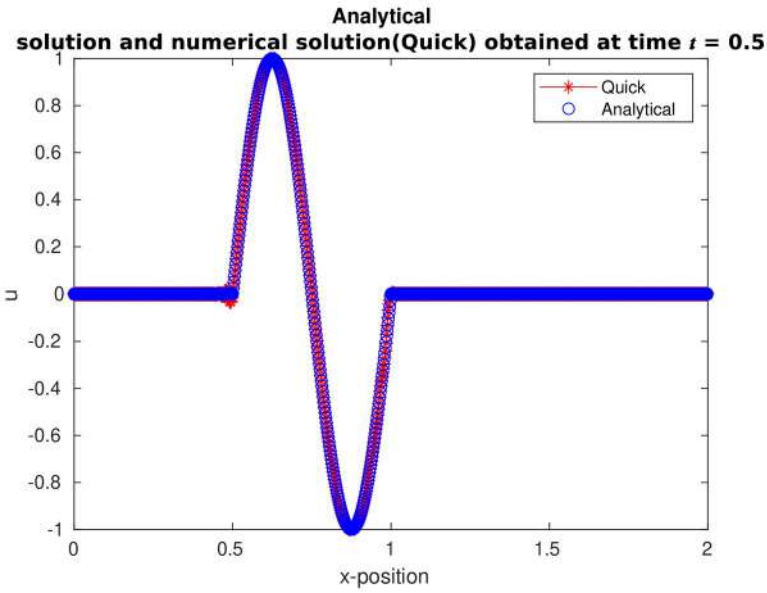




ii) t=0.5

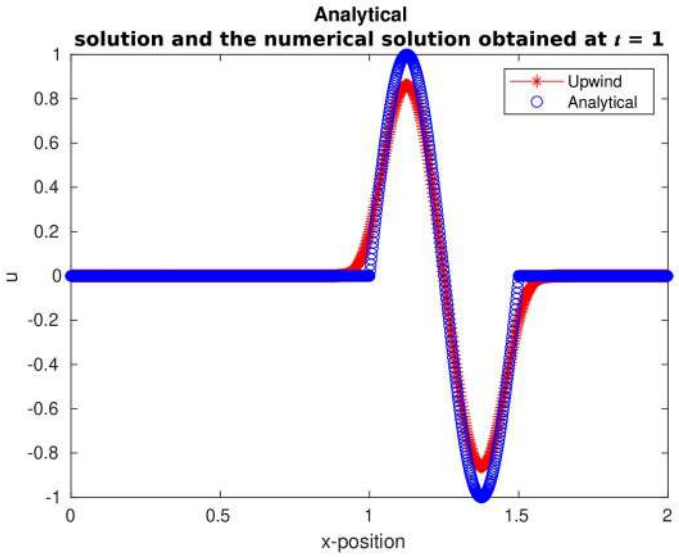
UPWIND ***Quick***



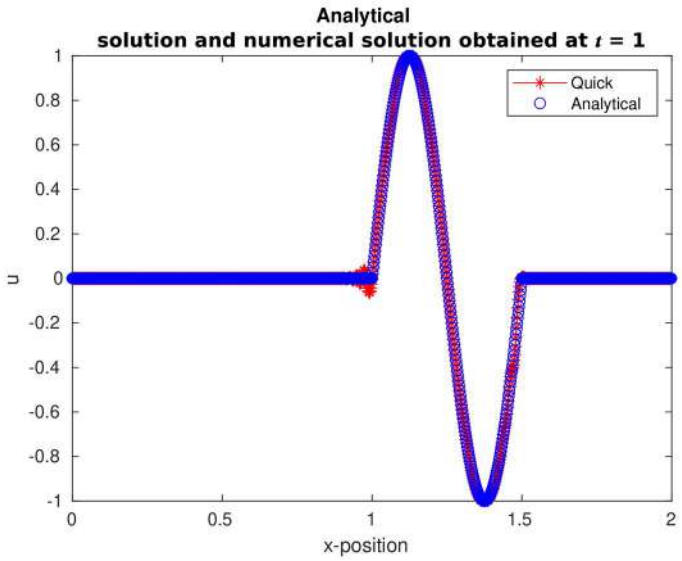


iii) t=1

UPWIND



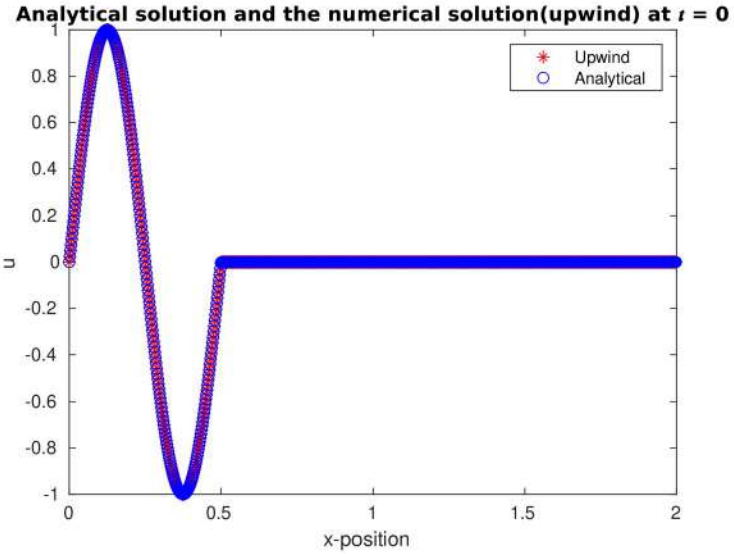
Quick



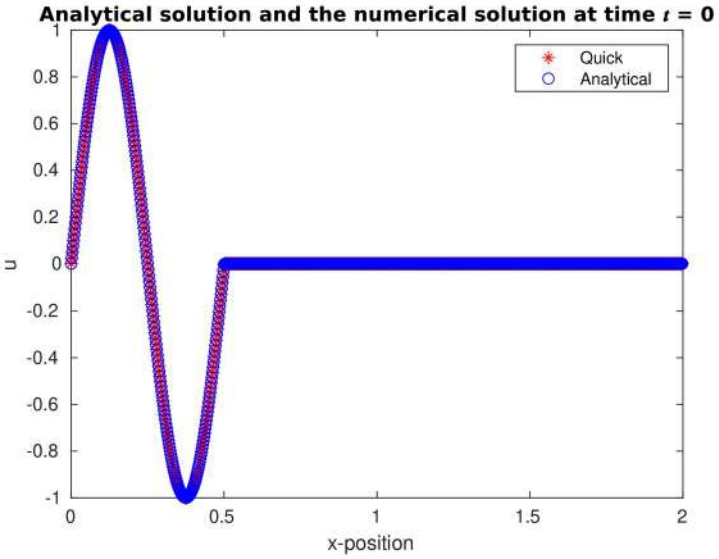
b) p=2

i) t=0

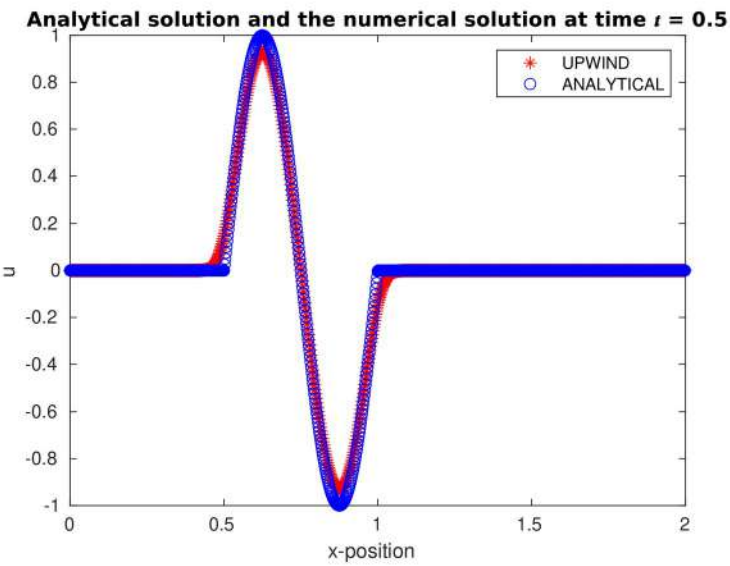
UPWIND

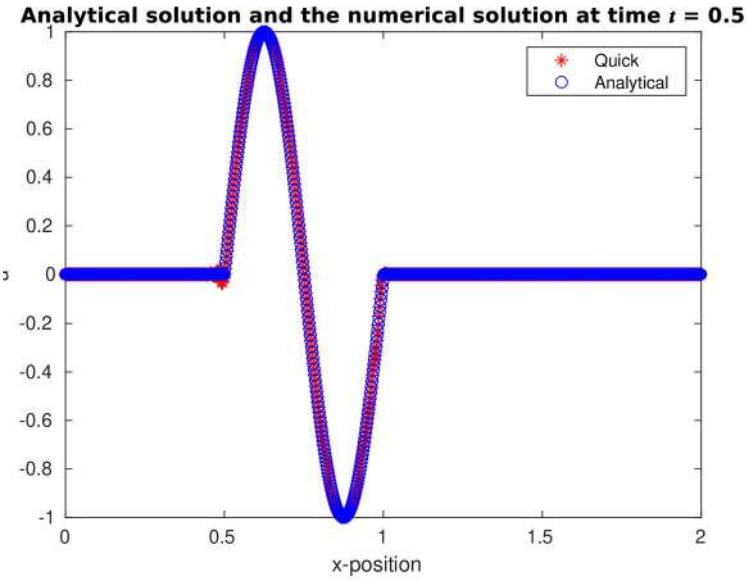


QUICK



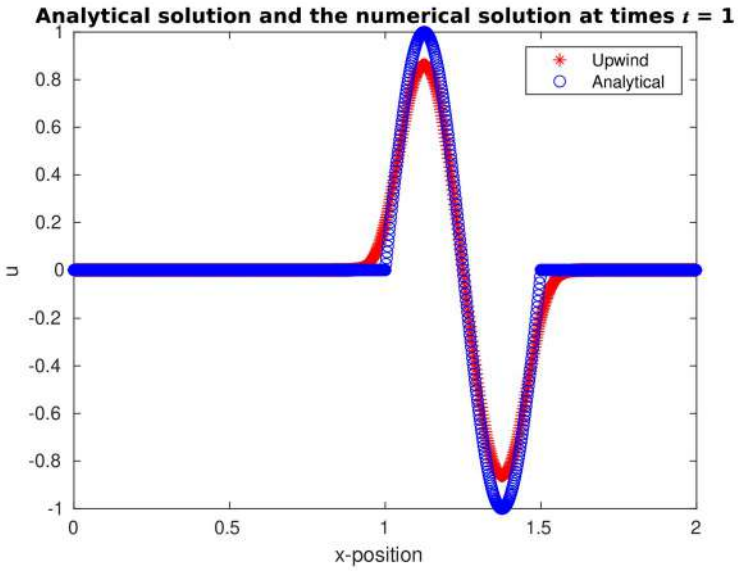
ii)t=0.5



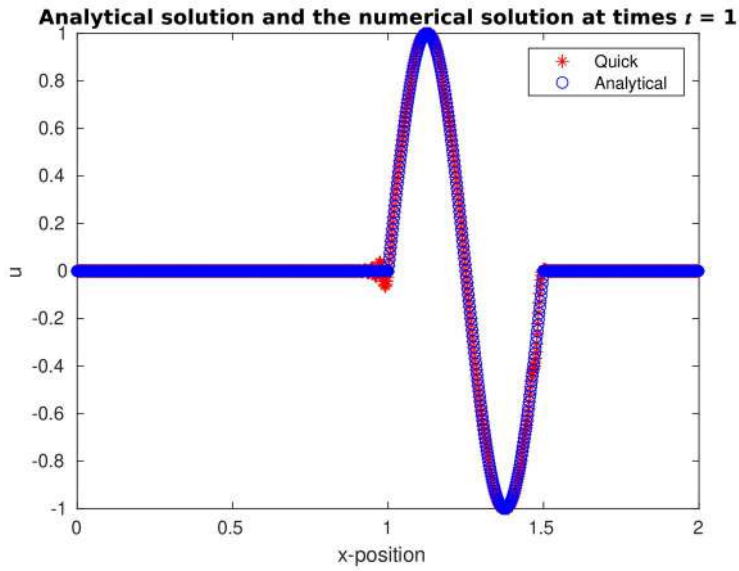


iii) t=1

UPWIND



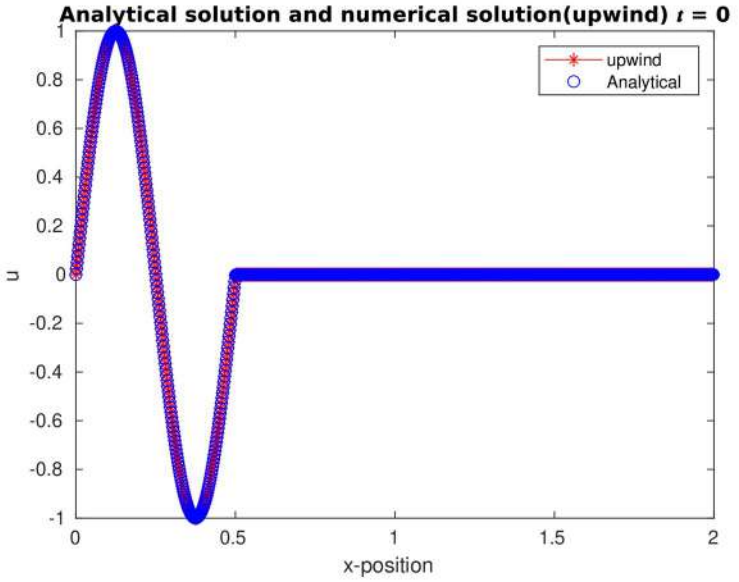
QUICK



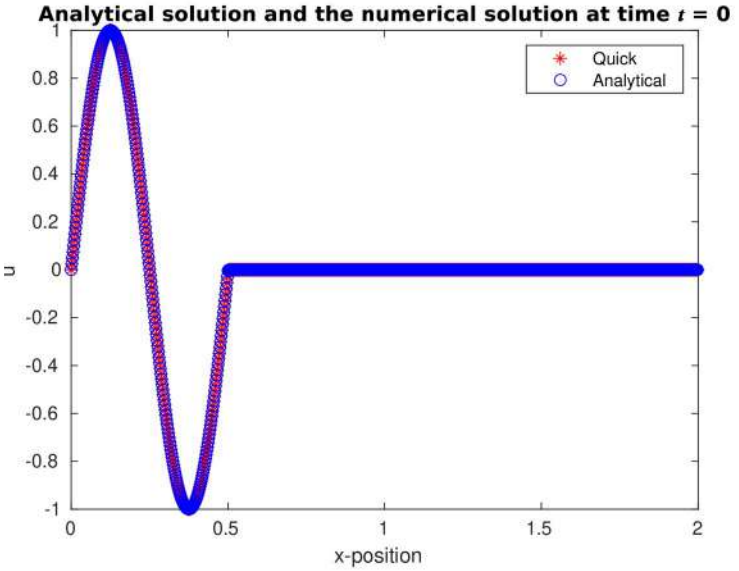
P=4

i) t=0

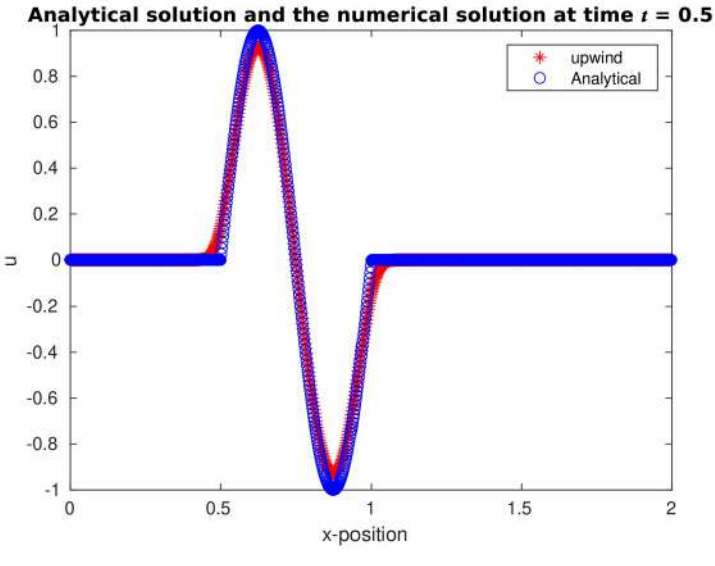
UPWIND

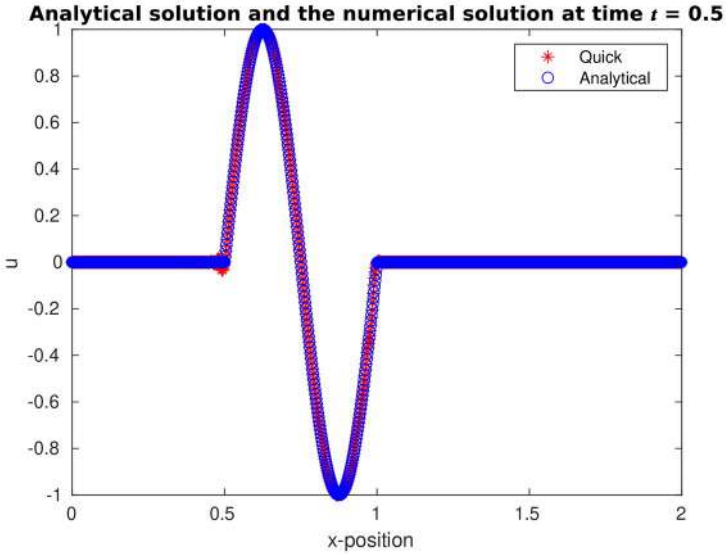


QUICK

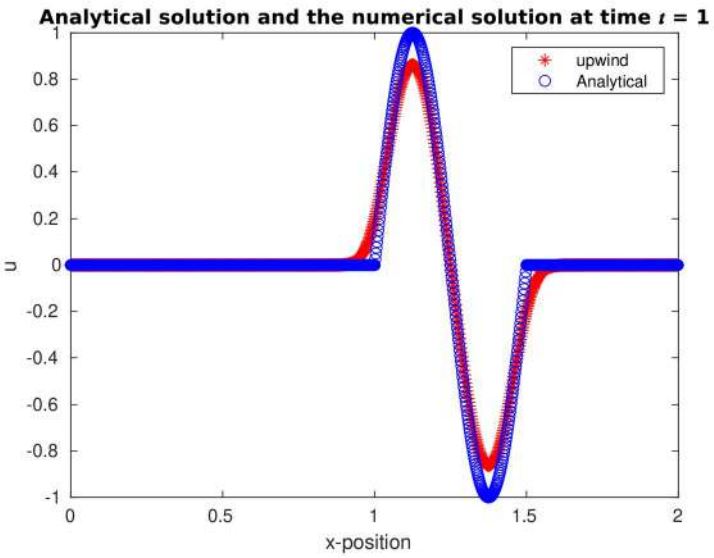


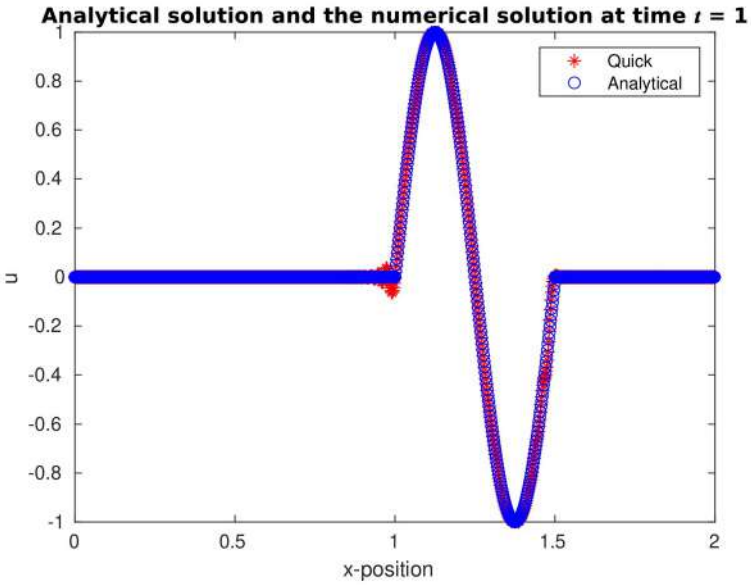
ii) t=0.5





iii) t=1 ***UPWIND*** ***QUICK***





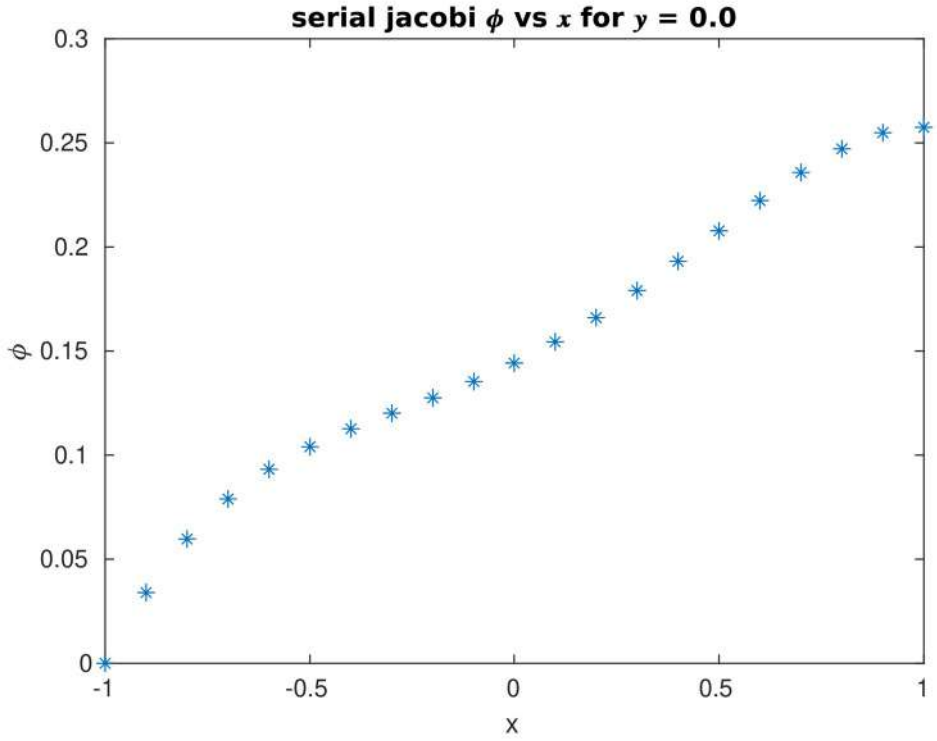
C)

Quick scheme is more accurate than upwind scheme.But upwind scheme is more stable compared quick scheme ther are little fluctuations in quick scheme.

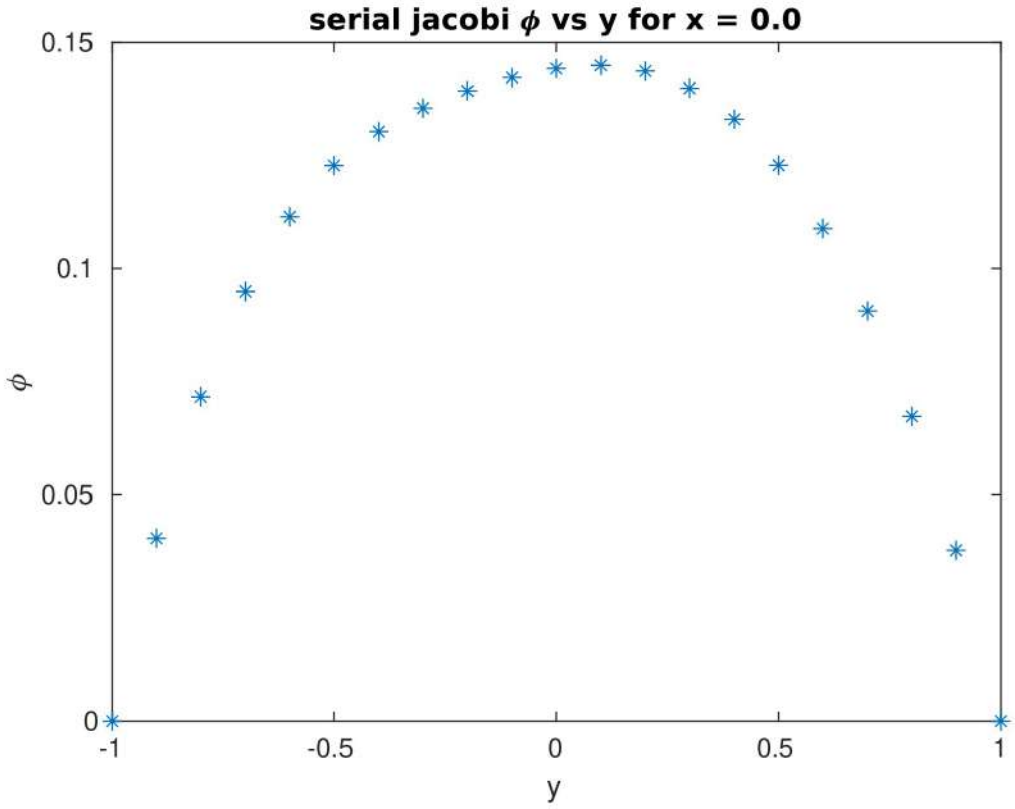
2)

The number of iterations for the solution between successive iterations to converge to 10−4 is 584.

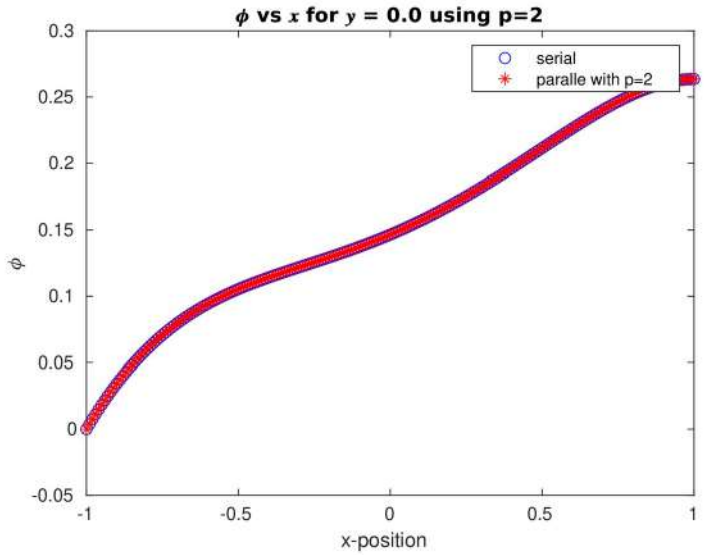
i)

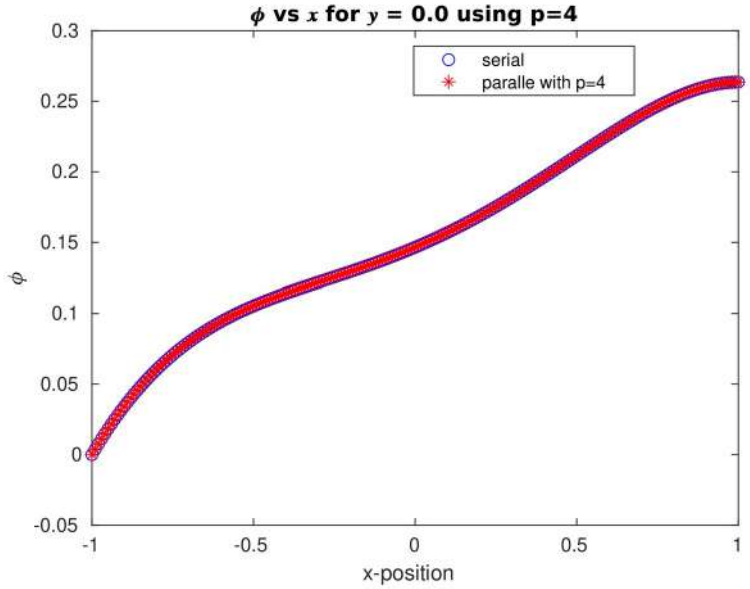


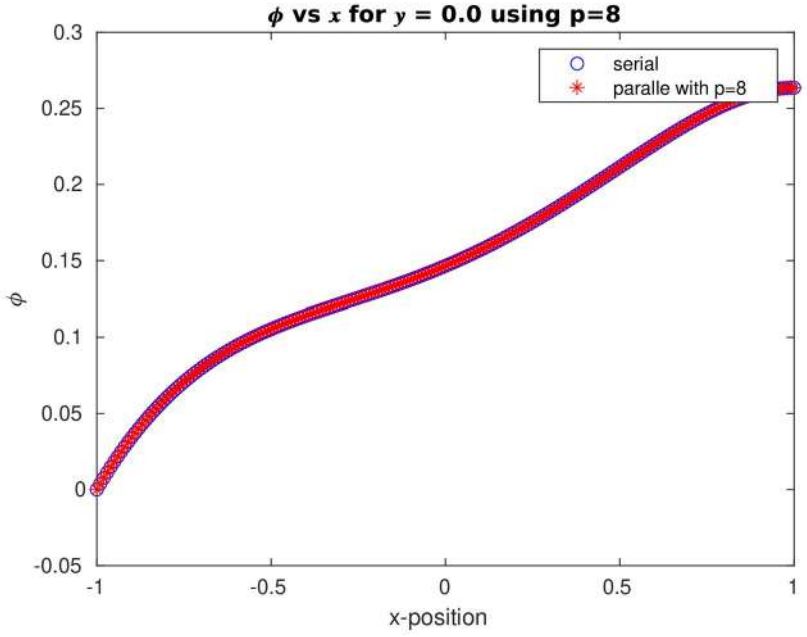
ii)



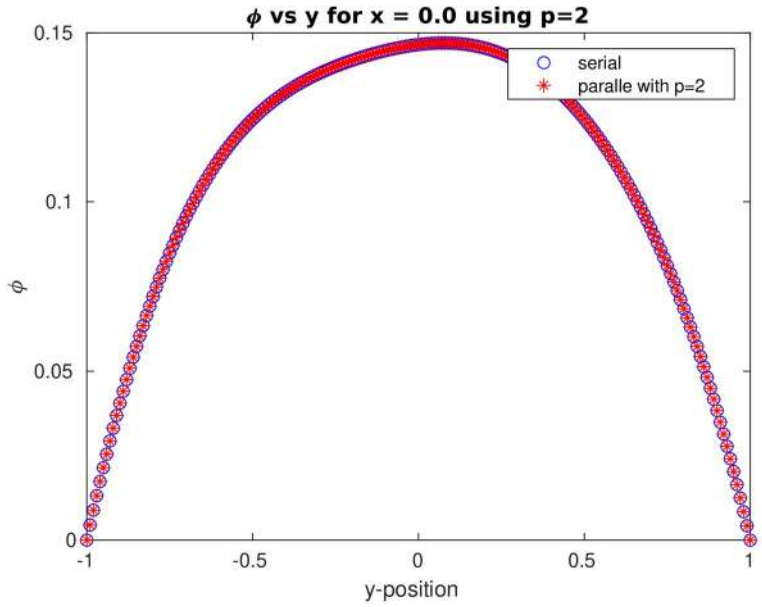
b) Parallel jacobi using P = 2, 4, 8 for ϕ vs x for y = 0.0

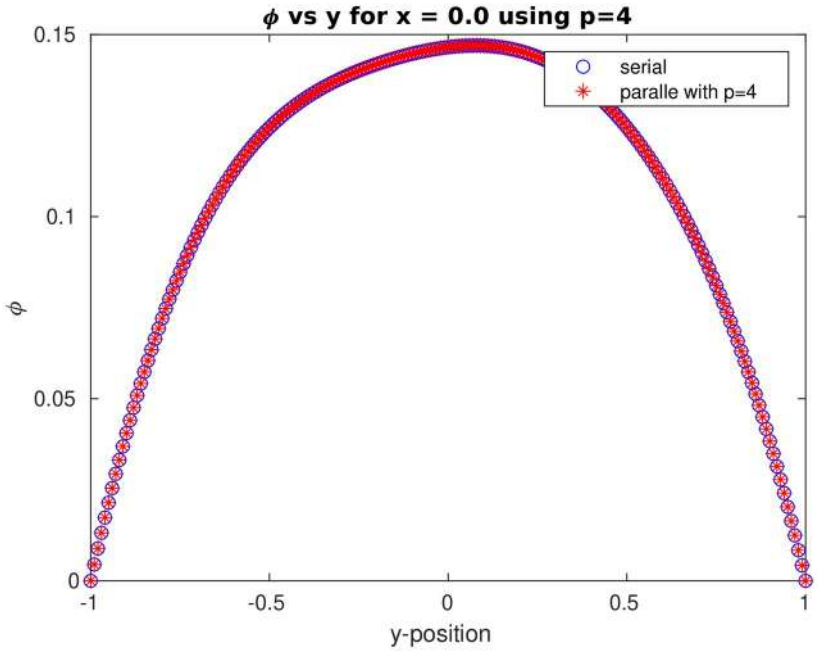


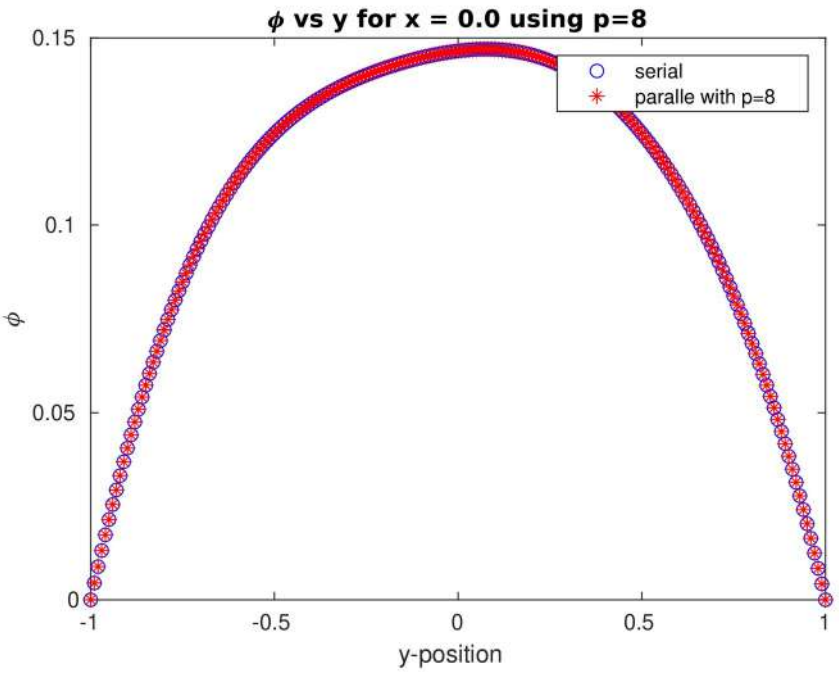




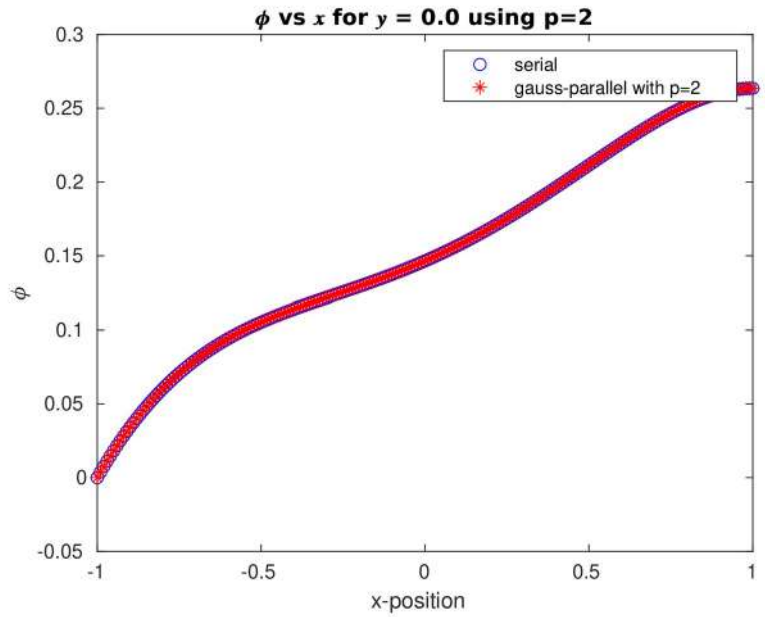
Parallel jacobi using P = 2, 4, 8 for ϕ vs y for x= 0.0

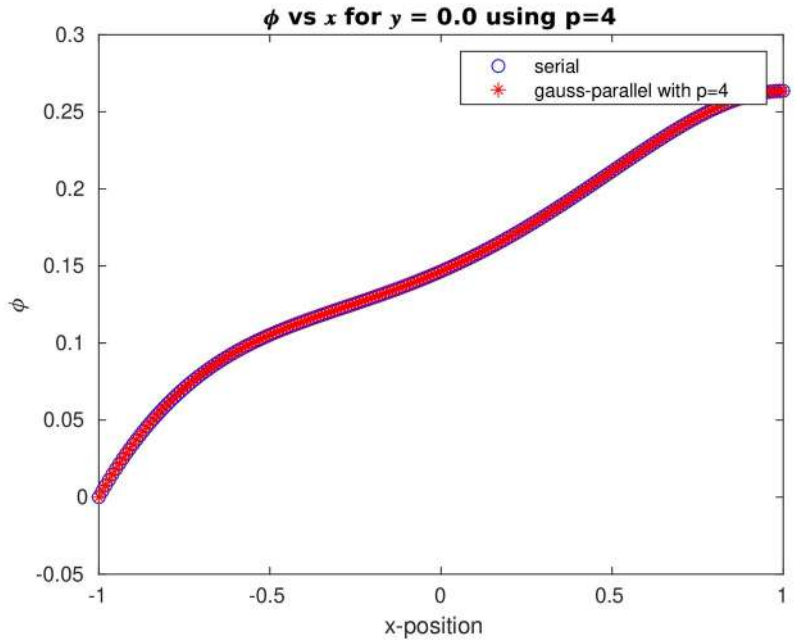


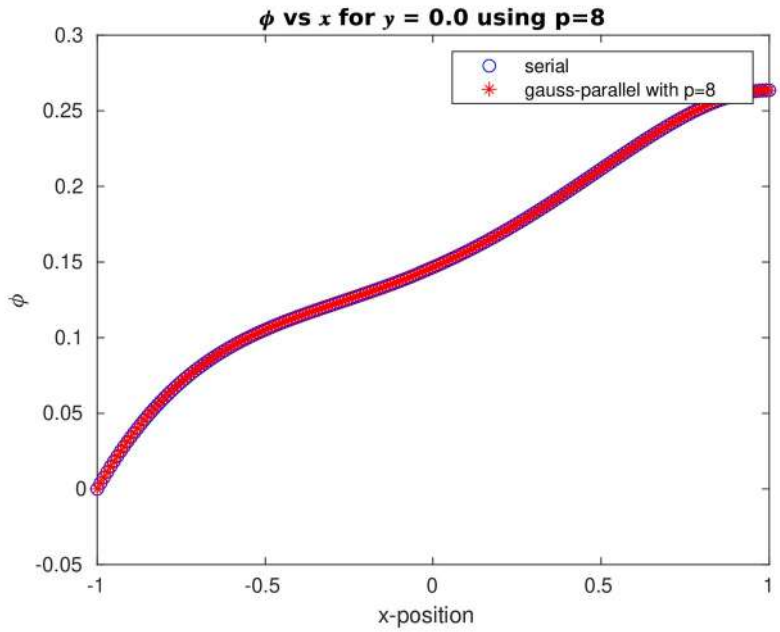




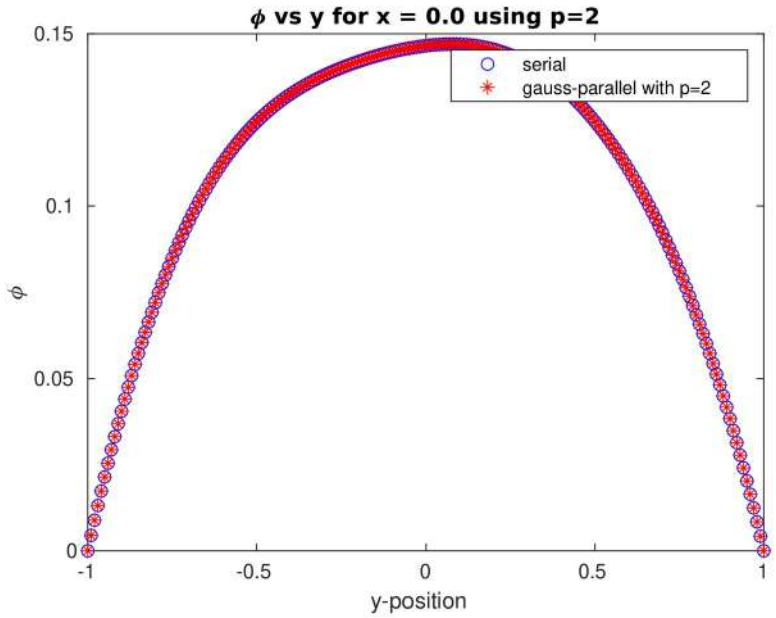
c) Gauss-Seidel red-black coloring approach using P = 2, 4, 8 for ϕ vs x for y = 0.0

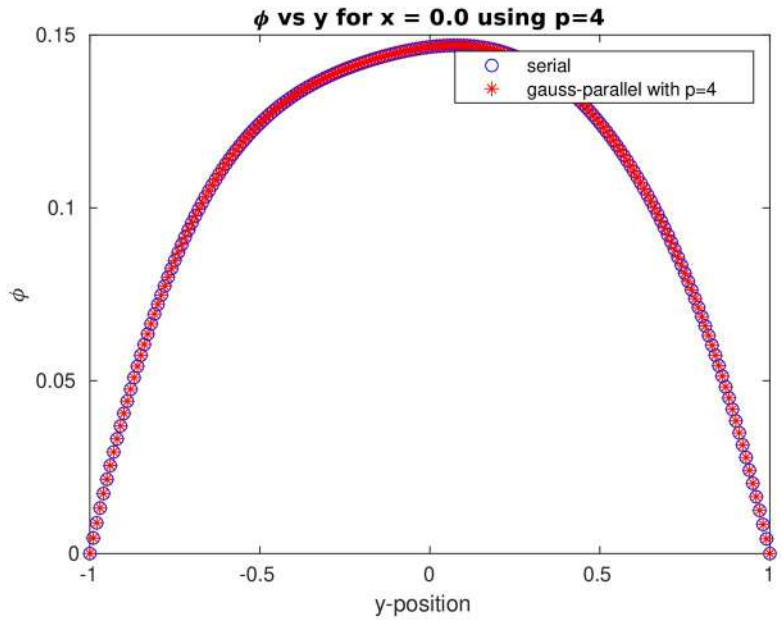


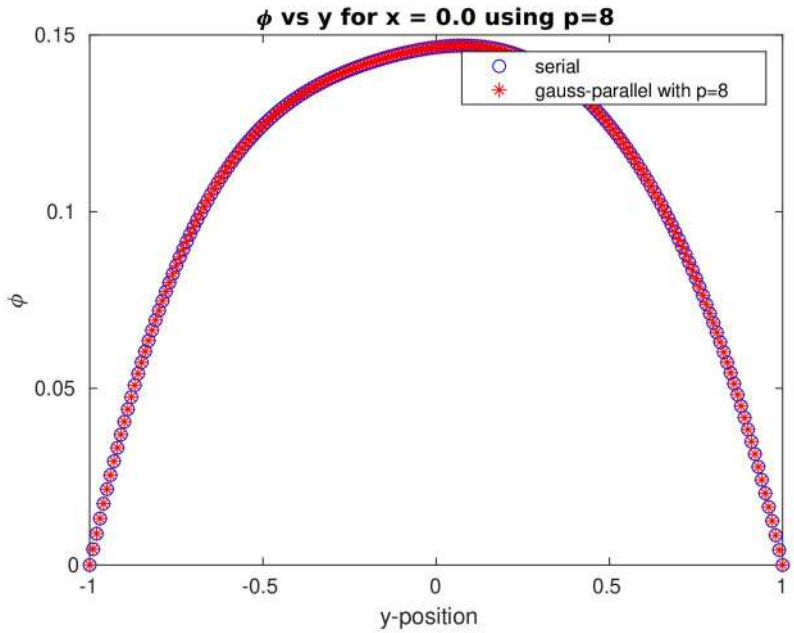




Gauss-Seidel red-black coloring approach using P = 2, 4, 8 for ϕ vs y for x = 0.0



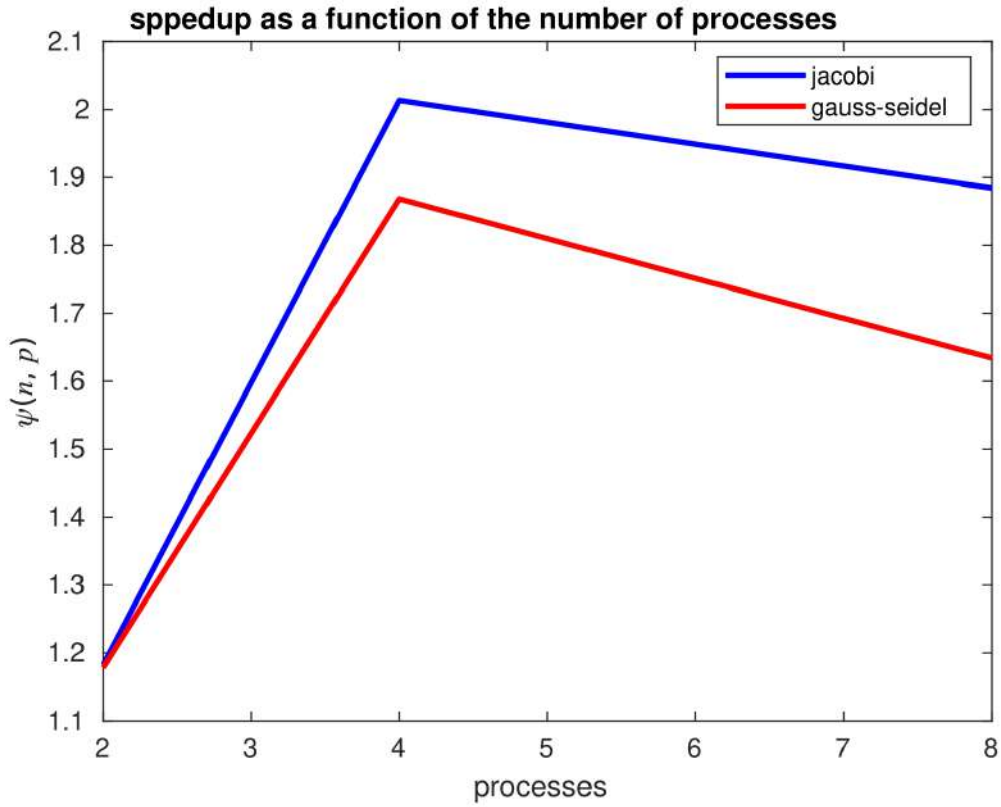




The iterations required by gauss-seidel is 228686
the iterations required by jacobi – parallel is 416544

***d)* speed up$\psi(n, p)$(For p=2,4,8)**

$\psi(n, p)$ =sequential execution time / parallel execution time



***** There is improvement in performance as we can see in plots that as we increase the p(p=2 to p=4) speed up also increased .Ther is a slight decrease in speed up when we go from p=4 to p= 8, it is because may be the communication time is more which is not optimum foir this problem.

***** Gauss seidel red-black approach is better in terms of computation time as it is taking less time compared to jacobi, and also it is taking less iterations.As far as I got jacobi has more potential to parallelization for this particular problem size as it has more speed up compared to gauss seidel red-black approach. May be if we increase in problem size it may be different.

***** Speedup increase as the problem size increases on the same number of processors