Q-1 Gram Schmidt Algorithm & QR decomposition

Sol i) Code attached. (Solution_1)

Sol ii) Code attached. (Solution_1)

Sol iii) Code attached. (Solution_1)

Sol iv) Code attached. (Solution_1)

$m = 7$, $n = 5$

Frobenious norm of A – 1.154449×10^{-15}

Total no. of Additions – 245

Total no. of Multiplications – 385

Total no. of Divisions – 35

Total no. of operations – 665

Q-2 Gradient Descent Algorithm.

i) Code attached. (Solution-2)

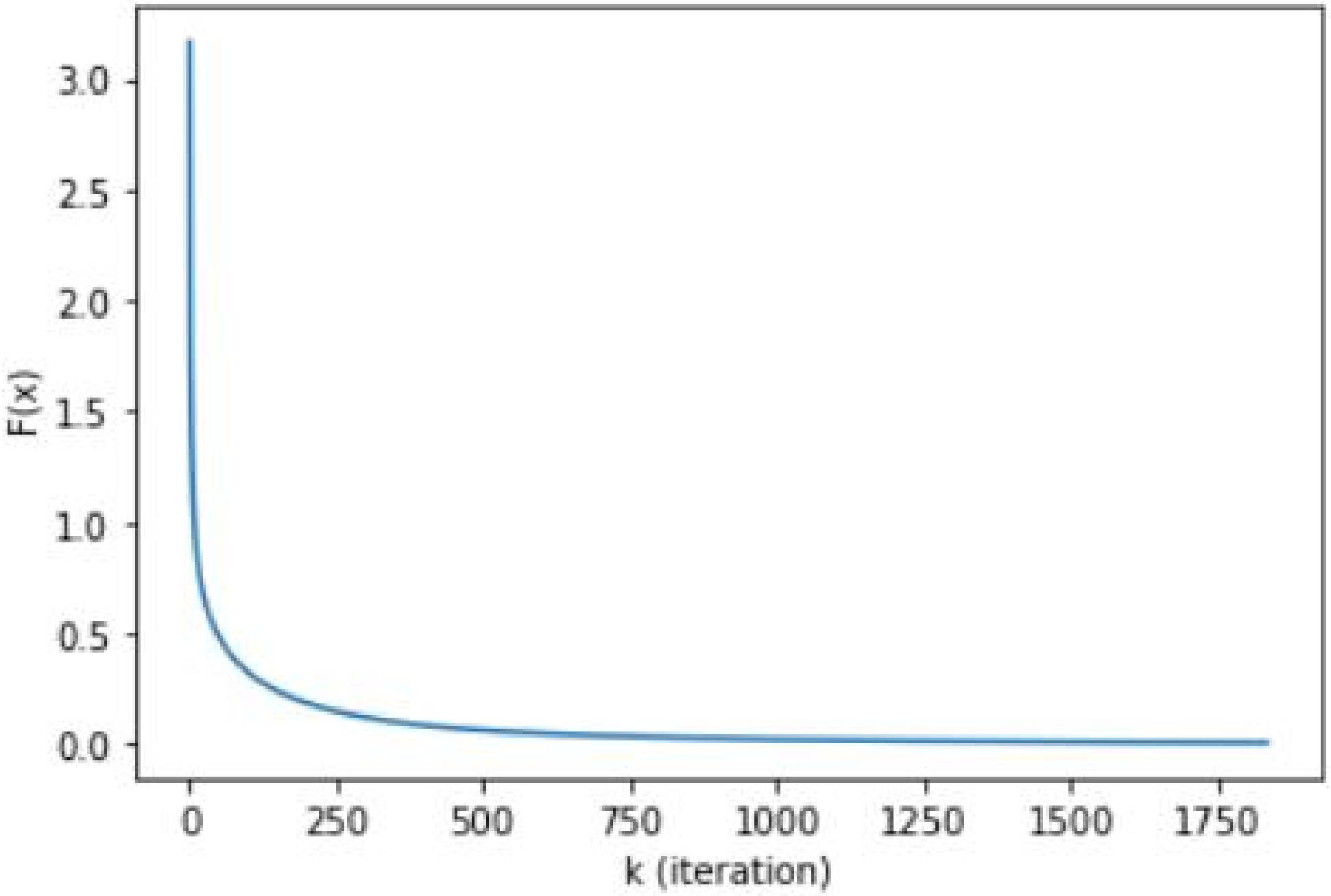
ii) Code attached (Solution.2)

Minimum value of given fn: 0.005646

Value of τ = 0.046659

x_k, $f(x_k)$ are stored in file. (attached)

iii) $f(x_k)$ vs k where k is iteration number.


3.0
2.5
2.0
1.5
1.0
0.5
0.0
F(x)
0
250
500
750
1000
1250
1500
1750
k (iteration)

Q-3 Critical Points of function.

Sol i) Phone Number = 826466671

Constructed Polynomial = $8x^3 - 2x^2y + 6xy^2 - 4y^3$

$6x^2 - 6xy + 6y^2 - 3x + 7y - 1$

Sol ii) Code attached. (Solution-3) (matlab)

Critical Points:

1. (-0.26031, -0.546109)
2. (-0.046707, 1.389617)
3. (-0.446875, 1.198503)
4. (-0.079932, -0.453129)

Sol iii) Code attached. (Solution-3) (matlab)

Critical Point	Type
(-0.26031, -0.546109)	Saddle Point
(-0.046707, 1.389617)	Saddle Point
(-0.446875, 1.198503)	Maxima
(-0.079932, -0.453129)	Minima