

Indian Institute of Technology Kharagpur
Department of Mathematics
MA11004 - Linear Algebra, Numerical and Complex Analysis
Hints and answers - Problem Sheet - 4
Spring 2021

Q.1 **ANS:** (0.99919, 3.0001, 0.00101)

HINT: Follow the algorithm of Gauss-Seidel Method.

Q.2 **ANS:** (0.186, 0.331, -0.423)

HINT: Follow the algorithm of Jacobi Method and Gauss-Seidel Method.

Q.3 **ANS:** (-1, 0), (0, 1), (1, 2)

HINT: Calculate the value of $f(x)$ at -1, 0, 1, 2 and check the signs of $f(x)$ at these points.

Q.4 **ANS:** 0.1875.

HINT: Calculate the value of $f(x)$ at 0 and 1, and check the signs of $f(x)$ at these points and then follow the algorithm.

Q.5 **ANS:** 0.5625.

HINT: Calculate the value of $f(x)$ at 0 and 1 and check the signs of $f(x)$ at these points and then follow the algorithm.

Q.6 **ANS:** 5.71875.

HINT: Follow the algorithm of Newton-Raphson Method.

Q.7 **ANS:** 0.77001784.

HINT: Take initial point equal to 1, and then follow the algorithm.

Q.8 **ANS:** 1.0017.

HINT: Choose $\phi(x) = \frac{\sin(x) + 10}{10}$.

Q.9 **ANS:** $x_{n+1} = \frac{x_n + \frac{N}{x_n}}{2}$, $x_1 = 1.416666$, $x_2 = 1.414215$

HINT: Take $f(x) = x^2 - N = 0$ and then follow the algorithm.

Q.10 **ANS:** $x_1 = 7.6666$, $x_2 = 5.1508$.

HINT: Take $f(x) = x^3 - 7 = 0$ and then follow the algorithm.

Q.11 **ANS:** 1.85558.

HINT: Take $g(x) = (x + 10)^{\frac{1}{4}}$.

Q.12 **ANS:** $\phi(x) = x + \alpha(3x^3 + 4x^2 + 4x + 1)$; $-\frac{8}{9} < \alpha < 0$.

HINT: Take $x = x + \alpha(3x^3 + 4x^2 + 4x + 1) = \phi(x)$.