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①

Question #01:

Q. Solve the following set of equations by gaussian elimination.

$$25x+5y+19z = 106.8$$
$$64x+8y+z = 177.2$$
$$144x+12y+z = 279.2$$

$$= \begin{bmatrix} 25 & 5 & 19 & 106.8 \\ 0 & -4.8 & -47.64 & -96.208 \\ 144 & 12 & 1 & 279.2 \end{bmatrix} R_2 - \left(\frac{64}{25}\right) R_1$$

$$= \begin{bmatrix} 25 & 5 & 19 & 106.8 \\ 0 & -4.8 & -47.64 & -96.208 \\ 0 & -16.8 & -108.44 & 279.2 \end{bmatrix} R_3 - \left(\frac{144}{25}\right) R_1$$

$$= \begin{bmatrix} 25 & 5 & 19 & 106.8 \\ 0 & -4.8 & -47.64 & -96.208 \\ 0 & 0 & 58.3 & 0.76 \end{bmatrix} R_3 - \left(\frac{-16.8}{-4.8}\right) R_2$$

(2)

For Z:

$$58.3z = 0.76$$
$$z = \frac{0.76}{58.3}$$
$$\boxed{z = 0.013036020 58}$$

Ans

For Y:

$$-4.8y - 47.64z = -96.208$$
$$-4.8y - 47.64(0.013036020 58) = -96.208$$
$$-4.8y - 0.621036 = -96.208$$
$$-4.8y = -96.208 + 0.621036$$
$$+4.8y = +95.158664$$
$$y = \frac{95.158664}{4.8}$$
$$\boxed{y = 19.913883 3}$$

Ans

(3)

Question Number #04

Use newton method to solve :

$$f(x) = 4.A x^4 + 21A x^3 - (135.A) x^2 - 8.A x - 85.0614$$

formula : $x_{i+1} - \frac{f(x_i)}{f'(x_i)}$

Given :

$x_0 = 2.19$ $\quad A = 14\ (10619)$

$x_{i+1} = ?$

Solve

$$f(x) = 4.19x^4 + 21.19x^3 - 135.19x^2 - 8.19x - 85.0614$$

$$f(x) = 4.19x^4 + 21.19x^3 - 135.21x^2 - 8.21x - 85.0614$$

$$f'(x) = 16.76x^3 + 63.57x^2 - 270.42x - 8.21 - 0$$

(4).

Iteration Tables

x_0	$f(x)$	$f'(x)$	x_{i+1}
2.19	-432.5729	-119.5038	-1.4297
-1.4297	-394.1371	459.3855	-0.5718
-0.5718	-128.0845	164.06	0.2089
0.2089	-92.4782	-61.7834	-1.2879

Question Number #05:

(a) Bisection Method:

Main reason this method fails is a double root means the function keeps the same sign except for reaching zero at one point. We can say f(a) and f(b) have the same sign at each step. Then it is not clear which half of the interval to take at each step.

(b) Newton Method:

Newton method fails in cases where derivative is zero. The tangent line is nearly horizontal and hence may overshoot the desired root.

(c) Gauss Elimination Method:

It fails when any of the pivots is zero. It is worse yet if any pivot becomes close to zero. In this case, the method can be carried to completion, but obtained results may be totally wrong.

(6)

Question Number #03

(a) $f(x) = 4\sin x + e^{-x} + 2.19$

(b) 2.19 and prod 2.19

(a) $f(x) = 4\sin x + e^{-x} + 2.19$

$A = 19$

$f(x) = 4\sin x + e^{-x} + 2.19$

put $x = 3.5$

$f(3.5) = 4\sin(3.5) + e^{-(3.5)} + 2.19 + 0.7306 \cdot 19$

There fore no root between 3.5 and 3.8

(b) $A = 19$

$x + y = 2.19$

$\sqrt{xy} = 2 \times 19$

$(\sqrt{xy})^2 = (38)^2$

$xy = 1444$

(7)

$x + y = 2 \cdot 19$

$x = 2 \cdot 19 - y$

$xy = 1111$

$(2 \cdot 19 - y)y = 1111$

$2 \cdot 19y - y^2 = 1111$

$-y^2 + 2 \cdot 19y - 1111 = 0$

$y = \frac{219 + 37 \cdot 98422}{200}$

$\boxed{y = -37 \cdot 98422}$

put y in eq(1)

$x + (-37 \cdot 98422) = 2 \cdot 19$

$x = 2 \cdot 19 + 37 \cdot 98422$

$\boxed{x = 40 \cdot 17422}$

Ans