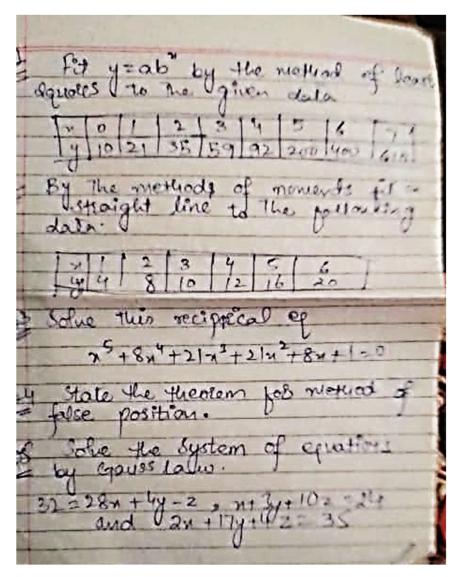
Total questions:

Figure **Error! No text of specified style in document.**-1, Total Question page 1, 1 to 5



Total question page 2, 6 to 10.

08	Solve Jan 43 Ja 3"11 In the table, one value of y is cubic polynomial in a mil a following for any equation uplaces the bisect lion methods.
9	Solve the of by syntheticy divinion make suce the thoras are in form ta, tb, c
10	Remove the second term of towns pointed of x4-8n3-n20+68n+6

Question no.1 answer below:

Example 1.14 Fit $y = ab^x$ by the method of least squares to the data giv_b below.

		2	3	4	3	•	7
x 0 y 10	21	35	59	92	200	400	610
y 10		NAME OF TAXABLE PARTY.			NAME OF TAXABLE PARTY.	STATE OF THE OWNER, WHEN	

Solution The curve to be fitted is $y = ab^x$ or Y = A + Bx, where $A = \log_{10} a$, $B = \log_{10} b$ and $Y = \log_{10} y$.

.. The normal equations are

$$\sum Y = 8A + B\sum x$$
 and $\sum xY = A\sum x + B\sum x^2$

*	y	$Y = \log_{10}$	y x²	xY
0	10	1.0000	0	0
1	21	1.3222	The court	1.3222
2	35	1.5441	Jan 9 10 4	3.0882
3	59	1.7708	9	5.3124
4	92	1.9638	16	7.8552
5	200	2.3010	25	11.5050
6	400	2.6021	36	15,6126
7	610	2.7853	49	19.4971
$\Sigma x = 28$		$\Sigma Y = 15.2893$	$\Sigma x^2 = 140$	$\Sigma xY = 64.1927$

Question no.2 answer below:

Not clear solution present

Question no.3 answer below:

Solve $x^3 - 5x^4 + 9x^3 - 9x^2 + 5x - 1 = 0$ Example 2.19

Solution Here, sum of all the coefficients is 0.

: x = 1 is a root of the given equation.

Therefore, the equation can be written as

$$(x-1)(x^4-4x^3+5x^2-4x+1)=0$$

 $x^4 - 4x^3 + 5x^2 - 4x + 1 = 0$

Dividing by x2 on both sides and adjusting the terms, we get

$$\left(x^2 + \frac{1}{x^2}\right) - 4\left(x + \frac{1}{x}\right) + 5 = 0$$

put
$$x + \frac{1}{x} = t$$
 so that $x^2 + \frac{1}{x^2} = t^2 - 2$
 $t^2 - 2 - 4(t) + 5 = 0$

$$t^2-2-4(t)+5=0$$
 or $t^2-4t+3=0$

$$x = \frac{1 \pm \sqrt{3}i}{2}$$

This question is similar to this, but solution not found.

Theory of Equations 2.21

Again,
$$t = 3 \Rightarrow x + 1/x = 3$$
 or $x^2 - 3x + 1 = 0$.
$$x = \frac{3 \pm \sqrt{5}}{2}$$

Hence, the roots of the given equation are

$$x=1, \frac{1\pm\sqrt{3}i}{2}, \frac{3\pm\sqrt{5}}{2}.$$

METHOD OF FALSE POSITION 3.4

This method, also known as regula falsi method, is the oldest method of finding the real root of an equation f(x) = 0 and is somewhat similar to the bisection method.

Consider the equation f(x) = 0. Let a and b (a < b) be two values of x such that f(a) and f(b) are of opposite signs. Then the graph of y = f(x)crosses the x-axis at some point between a and b (see Fig.3.3).

Therefore, the equation of the chord joining the two points A[a, f(a)]and B[b, f(b)] is

$$y - f(a) = \frac{f(b) - f(a)}{b - a}(x - a) \tag{3.6}$$

Now in the interval, (a, b), the graph of the function can be considered as a straight line. So the intersection of the line given by Eqn (3.6) with the x-axis will give an approximate value of the root. Putting y = 0 in Eqn. $-f(a) = \frac{f(b) - f(a)}{b - a} (x - a)$ (3.6), we get

$$-f(a) = \frac{f(b) - f(a)}{b - a} (x - a)$$

$$= \frac{f(b) - f(a)}{b - a} (x - a)$$

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$$x = \frac{a f(b) - b f(a)}{f(b) - f(a)}$$

Hence, the first approximation to the root is given by

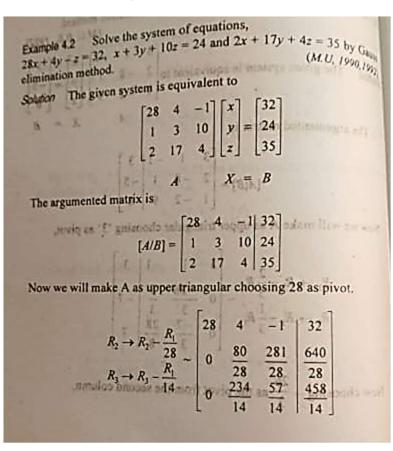
$$x_{i} = \frac{a f(b) - b f(a)}{f(b) - f(a)}$$
(3.7)

Now, if $f(x_i)$ and f(a) are of opposite sign then the root lies in between and x_i . So we replace b by x_i in Eqn (3.7) and get the next approximation

But if $f(x_i)$ and f(a) are of the same sign then $f(x_i)$ and f(b) will be of opposite signs and therefore, the root lies in between x, and b. Hence, we teplace a by x_1 in Eqn (3.7) and get the next approximation x_2 . The process is to be repeated till the root is found to the desired accuracy.

Question no.5 answer below:

Question 5 part 1 1



Question 5 part 1 2

Now the pivot is
$$\frac{234}{14}$$

$$R(2,3) \sim \begin{bmatrix} 28 & 4 & -1 & | & 32 \\ 0 & \frac{234}{14} & \frac{57}{14} & | & \frac{458}{14} \\ 0 & \frac{80}{28} & \frac{281}{28} & | & \frac{640}{28} \end{bmatrix}$$

$$R_3 \rightarrow R_3 - \frac{20}{117}R_2 \sim \begin{bmatrix} 28 & 4 & -1 & | & 32 \\ 0 & \frac{234}{14} & \frac{57}{14} & | & \frac{458}{14} \\ 0 & 0 & \frac{30597}{1638} & | & \frac{56560}{1638} \end{bmatrix}$$

From this, we get
$$28x + 4y - z = 32$$

$$234y + 57z = 458$$
and
$$30597z = 56560$$
Now by back substitution, we get
$$z = \frac{56560}{30597} = 1.8485472$$

$$y = \frac{458 - 57z}{234} = 1.5069778$$
and
$$x = \frac{-4y + z + 32}{28} = 0.9935941$$

Question no.6 answer below:

Example 10.9 Solve
$$y_{n+2} - 4y_{n+1} + 3y_n = 3^n + 1$$
.
Solution The given equation in symbolic form is
$$(E^2 - 4E + 3) y_n = 3^n + 1$$
AE is $E^2 - 4E + 3 = 0$, i.e. $(E - 1) (E - 3) = 0$, $\therefore E = 1, 3$

$$\therefore CF = C_1 (1)^n + C_2 3^n = C_1 + C_2 3^n$$

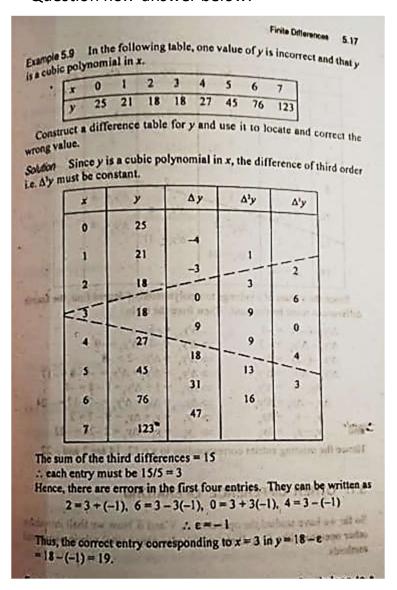
$$PI = \frac{1}{E^2 - 4E + 3} (3^n + 1) = \frac{1}{(E - 1)(E - 3)} (3^n + 1)$$

$$= \frac{1}{(E - 1)(E - 3)} 3^n + \frac{1}{(E - 1)(E - 3)} (1)^n$$

$$= \frac{1}{(3 - 1)} \frac{1}{(E - 3)} 3^n + \frac{1}{(1 - 3)} \frac{1}{(E - 1)} (1)^n$$

$$= \frac{1}{2^n} 3^{n-1} - \frac{1}{2^n} (1)^{n-1} = \frac{1}{2^n} (3^{n-1} - 1)$$
Hence, the general solution to Eqn (i) is
$$y_n = C_1 + C_2 3^n + \frac{1}{2^n} (3^{n-1} - 1)$$

Question no.7 answer below:



Question no. 8 answer below:

For any equations proves the bisection method.

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Question no.9 answer below:

Example 2.5 Solve the equation $x^3 - 5x^4 - 5x^3 + 25x^2 + 4x - 20 = 0$ that its roots are of the form $\pm a$, $\pm b$, c.

Solution Sum of the roots is

$$a-a+b-b+c=5$$
 : $c=5$

But c is a root of the given equation. Hence, x-5 is a factor of the given equation.

.. The depressed equation (by synthetic division) is

$$x^4 - 5x^2 + 4 = 0$$
 or $(x^2 - 4)(x^2 - 1) = 0$
 $x = \pm 2, \pm 1$

Hence, the roots are ± 2 , ± 1 and 5.

:.

Question no.10 answer below:

Example 2.15 Remove the second term in the transformed equality $x^4 - 8x^3 - x^2 + 68x + 60 = 0$ and hence solve it.

Solution Here, sum of the roots is -(-8/1) = 8Degree = 4 : h = 8/4 = 2.

Now, diminishing the given equation by 2 (using synthetic division we have

2 | 1 -8 -1 68 60
0 2 -12 -26 84
2 | 1 -6 -13 42 | 144
0 2 -8 -42
2 | 1 -4 -21 | 0
0 2 -4
2 | 1 -2 | -25
0 2
1 | 0
Therefore, the transformed equation is

$$y^4 - 25y^2 + 144 = 0$$
 (where $y = x - 2$)

$$y^4 - 25y^2 + 144 = 0$$
 (where $y = x - 2$)
or $(y^2 - 9)(y^2 - 16) = 0$, i.e. $y = \pm 3$, ± 4

Hence, the roots of the given equation are

$$x = -1, -2, 5, 6.$$