

① $f(x) = x^3 + 2x^2 - 22x - 40$

Factors of 40 = -1, 1, 2, -2, 4, -4, 8, -8, 5, -5, 10, -10, 20, -20, 40, -40

Try and error

$$x^3 + 2x^2 - 22x - 40 = 0$$

$$x^3 + 2x^2 - 22x - 40 = x^2 + 2x^2 - 20x - 40 - 2x$$

$$x^2(x+2) - 20(x+2) - 2x = 0$$

$$(x^2 - 20)(x+2) - 2x = 0$$

$$(x^2 - 20)(x+2) = 2x$$

$$x^2 - 20 = 2x$$

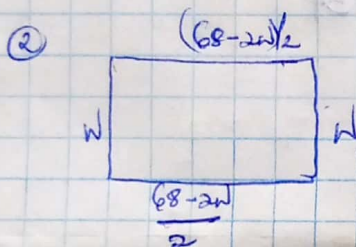
$$x^2 - 2x - 20 = 0$$

$$x = \frac{2 \pm \sqrt{4 + 80}}{2} = \frac{2 \pm 9.2}{2} = 5.6 \text{ or } -3.6$$

$$x+2 = 2x$$

$$x - 2x = -2$$

$$-x = -2 \Rightarrow x = 2$$



Let the width be w

$$68 = 2w + 8$$

$$2w = 60 \Rightarrow w = 30$$

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$$\text{length} = 34 - w = 34 - 30 = 4$$

③ $f(x) = \frac{x-7}{x^2-9x+14} = \frac{x-7}{(x-2)(x-7)} = \frac{1}{x-2}$

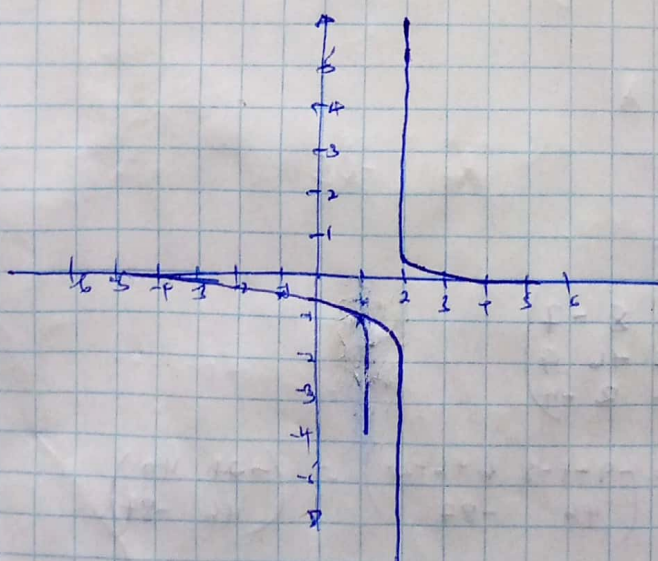
Dimensions = 30 X 4

$$\text{VA} \mid x-2=0$$

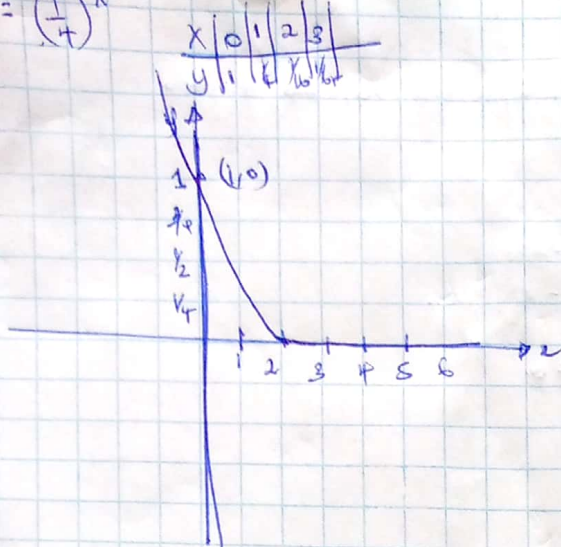
$$x=2$$

$$\text{HA} = 0$$

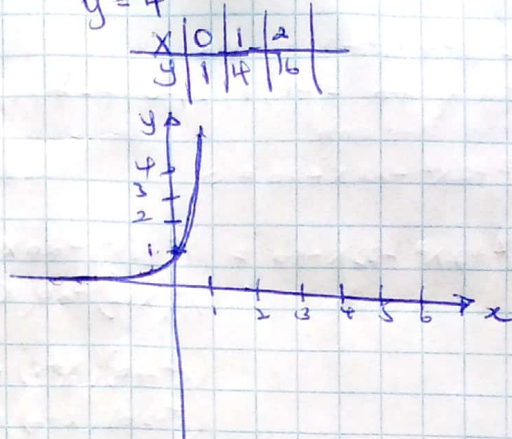
No hole since no common factor



$$y = \left(\frac{1}{4}\right)^x$$



$$y = 4^x$$



⑤ $2x + 7y + 4z = 3$
 $x - 2y + z = 4$
 $-4x + 4y + z = 2$

Cramer's rule

$$\begin{pmatrix} 2 & 7 & 4 \\ 1 & -1 & 1 \\ -4 & 4 & 2 \end{pmatrix} \begin{matrix} x \\ y \\ z \end{matrix} = \begin{pmatrix} 3 \\ 4 \\ 2 \end{pmatrix}$$

$$D = \begin{vmatrix} 2 & 7 & 4 \\ 1 & -1 & 1 \\ -4 & 4 & 2 \end{vmatrix} = +2(-6) - 7(6) + 4(0) = -58$$

$$D_x = \begin{vmatrix} 3 & 7 & 4 \\ 4 & -1 & 1 \\ 2 & 4 & 2 \end{vmatrix} = +3(-6) - 7(6) + 4(18) = 12$$

$$D_y = \begin{vmatrix} 2 & 3 & 4 \\ 1 & 4 & 1 \\ -4 & 2 & 2 \end{vmatrix} = +2(6) - 3(6) + 4(18) = 66$$

$$D_z = \begin{vmatrix} 2 & 7 & 3 \\ 1 & -1 & 4 \\ -4 & 4 & 2 \end{vmatrix} = +2(-18) - 7(18) + 3(0) = -162$$

$$x = \frac{D_x}{D} = \frac{12}{-58} = -\frac{24}{29}$$

$$y = \frac{D_y}{D} = \frac{66}{-58} = -\frac{33}{29}$$

$$z = \frac{D_z}{D} = \frac{-162}{-58} = \frac{81}{29}$$

⑥ a) $\begin{pmatrix} 2 & 4 & -5 \\ -8 & -1 & 7 \\ 5 & -2 & 4 \end{pmatrix} - \begin{pmatrix} -1 & -4 & 2 \\ -3 & 5 & 2 \\ 7 & -4 & 8 \end{pmatrix} = \begin{pmatrix} 3 & 8 & -7 \\ -5 & -6 & 9 \\ -2 & 2 & -4 \end{pmatrix}$

7 b) $\begin{pmatrix} -3 & 1 & -4 \\ 4 & -5 & 7 \end{pmatrix} \begin{pmatrix} 3 & 2 \\ -4 & 8 \\ 2 & 7 \end{pmatrix} = \begin{pmatrix} -9+4-8 & 6+6+28 \\ 16 & -87 \end{pmatrix} = \begin{pmatrix} -24 & 40 \\ 16 & -87 \end{pmatrix}$

⑧ $A = P(1 + \frac{r}{n})^{nt}$ $P = 12000$, $r = 8\%$, $n = 12$, $t = 6$

$$A = 12000 \left(1 + \frac{0.08}{12}\right)^{12 \times 6} = \$19362$$

⑨ $A = 20000$, $r = 15\%$ $P = \frac{A}{(1 + \frac{r}{n})^{nt}} = \frac{20000}{(1 + \frac{0.15}{12})^{10}} = \4944 rounded off to the nearest dollar

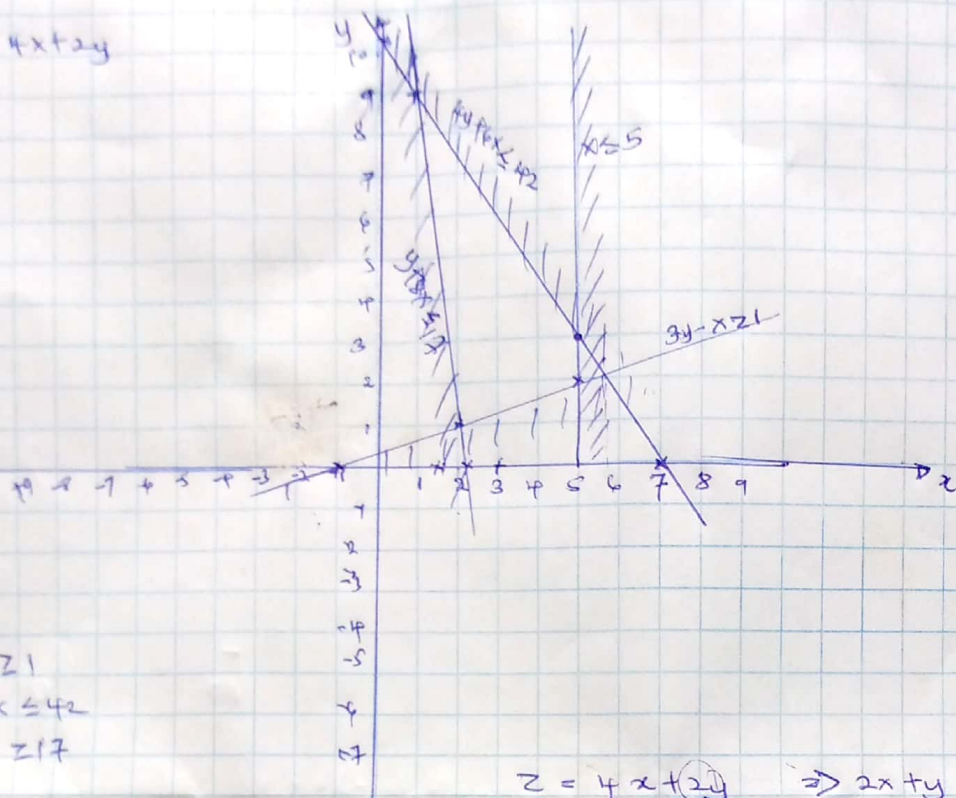
$$\log(3x-2) = 0$$

$$\log^{-1} 0 = 3x-2 = 1 \Rightarrow 3x-2=1 \Rightarrow x=1$$

$$(b) \log_{25}(x-5) = \frac{1}{2}$$

$$\log_{25} \frac{1}{2} = x-5 \quad 5 = x-5 \quad x=10$$

$$(11) Z = 4x + 2y$$



$$3y - x \geq 1$$

$$4y + x \leq 42$$

$$y + 8x \leq 17$$

$Z = 4x + 2y$ maximum
at $(5, 3)$

$$Z = 4x + 2y \Rightarrow 2x + y = \frac{Z}{2}$$

x	0	1	2
y	0	1	2
Z	0	6	12

$$(12) r = 12\%$$

$$m = 12$$

$$t = 30$$

$$A = P(1 + \frac{r}{m})^{mt} \quad \text{but } P = a + d \quad \text{where } A \text{ and } d = 500$$

$$P' = A + 500$$

$$\text{New principal} = (\text{Amount} + 500)$$

$$A = 500(1 + 0.01)^{12} = 505 \quad \text{amt after first deposit}$$

$$A' = (505 + 500)(1 + 0.01)$$

$$\text{Number of deposits remaining} = 359$$

$$A' = (505 + 500 \times 359)(1 + 0.01)^{359} = 6407.04407$$

$$A = 500(1 + 0.01)^{360}$$

$$(A + d)^{mt}$$