

(a) Differentiate between an equation and an expression

An equation tries to find the equality of two expressions while An expression represents a value using ~~number~~ a combination of numbers, variables & mathematical operations but does not make a comparison.

(b) Solve for ~~x~~ : $\log_5(x+2) - \log_5(x) = \log_5(2x-1) - \log_5(3x-12)$

$$\cancel{\log_5 \frac{(x+2)}{x}} = \cancel{\log_5 \frac{(2x-1)}{3x-12}}$$

$$(x+2)(3x-12) = x(2x-1)$$

$$3x^2 - 12x + 6x - 24 = 2x^2 - x$$

$$3x^2 - 6x - 24 = 2x^2 - x$$

$$3x^2 - 2x^2 - 6x + x - 24 = 0$$

$$x^2 - 5x - 24 = 0$$

$$= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{5 \pm \sqrt{25 - (4 \times 1 \times -24)}}{2}$$

$$= \frac{5 \pm \sqrt{121}}{2}$$

$$\underline{\underline{x = 8 \text{ or } -3}}$$

(c) Write in Index notation form $\log_{10} 1000 = 3$

$$\cancel{10^{\log_{10} 1000} = 3}$$

$$10^3 = 1000$$

(d) Solve for X, Y and Z

$$2x + 4y - z = 15$$

$$3x + 8y + z = 44$$

$$x + 2y + 2z = 15$$

$$d, dx, dy, dz$$

$$x = \frac{dx}{d}, y = \frac{dy}{d}, z = \frac{dz}{d}$$

$$d = \begin{bmatrix} 2 & 4 & -1 \\ 3 & 8 & 1 \\ 1 & 2 & 2 \end{bmatrix}$$

$$dz = \begin{bmatrix} 2 & 4 & 15 \\ 3 & 8 & 44 \\ 1 & 2 & 15 \end{bmatrix}$$

$$d = 2(16 - 2) - 4(6 - 1) - 1(6 - 8)$$

$$dz = 2(120 - 88) - 4(45 - 44) + 15(-2)$$

$$d = 28 - 20 + 2$$

$$dz = 64 - 4 - 30$$

$$d = 10$$

$$dz = 30$$

$$dx = \begin{bmatrix} 15 & 4 & -1 \\ 44 & 8 & 1 \\ 15 & 2 & 2 \end{bmatrix}$$

$$x = \frac{-50}{10} \quad y = \frac{70}{10} \quad z = \frac{30}{10}$$

$$dx = 15(16 - 2) - 4(88 - 15) - 1(88 - 120)$$

$$x = -5, y = 7, z = 3$$

$$dx = 210 - 292 + 32$$

$$dx = -50$$

$$dy = \begin{bmatrix} 2 & 15 & -1 \\ 3 & 44 & 1 \\ 1 & 15 & 2 \end{bmatrix}$$

$$dy = 2(88 - 15) + 15(6 - 1) - 1(45 - 44)$$

$$dy = 146 - 75 - 1$$

$$dy = 70$$

e) Solve for the unknowns by elimination method

$$3p + q = 8$$

$$4p + 2q - 12 = 0$$

$$4(3p + q = 8)$$

$$3(4p + 2q = 12)$$

$$12p + 4q = ~~32~~ 32$$

$$12p + 6q = 36$$

$$\begin{array}{r} -2q = -4 \\ \hline -2 \quad -2 \end{array}$$

$$q = 2$$

$$\Rightarrow 3p + 2 = 8$$

$$\Rightarrow 3p = 8 - 2$$

$$\Rightarrow \frac{3p}{3} = \frac{6}{3}$$

$$p = 2$$

F) Convert to binary 132_{10}

$$\frac{132}{2} = 66 \text{ rem } 0$$

$$\frac{66}{2} = 33 \text{ rem } 0$$

$$\frac{33}{2} = 16 \text{ rem } 1$$

$$\frac{16}{2} = 8 \text{ rem } 0$$

$$\frac{8}{2} = 4 \text{ rem } 0$$

$$\frac{4}{2} = 2 \text{ rem } 0$$

$$\frac{2}{2} = 1 \text{ rem } 0$$

$$\frac{1}{2} = 0 \text{ rem } 1$$

$$132_{10} = 10000100_2$$