

### Quiz 6

**Question 1. (4 marks)** Solve for y in the following system using Cramer's rule.

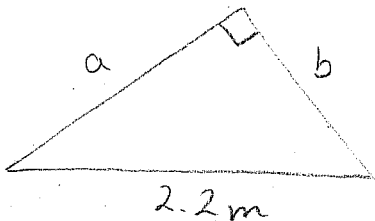
$$\begin{aligned} 2x - 2y + 3z &= 5 \\ 2x + y - 2z &= -1 \\ 4x - y - 3z &= 0 \end{aligned}$$

$$y = \frac{\begin{vmatrix} 2 & 5 & 3 \\ 2 & -1 & -2 \\ 4 & 0 & -3 \end{vmatrix}}{\begin{vmatrix} 2 & -2 & 3 \\ 2 & 1 & -2 \\ 4 & -1 & -3 \end{vmatrix}} = \frac{8}{-24} = -\frac{1}{3}$$

$$\begin{vmatrix} 2 & -2 & 3 & | & 2 & -2 \\ 2 & 1 & -2 & | & 2 & -1 \\ 4 & -1 & -3 & | & 4 & 0 \end{vmatrix} = -6 + 16 - 6 - 12 - 4 - 12 = -24$$

$$\begin{vmatrix} 2 & 5 & 3 & | & 2 & 5 \\ 2 & -1 & -2 & | & 2 & -1 \\ 4 & 0 & -3 & | & 4 & 0 \end{vmatrix} = 6 - 40 + 0 + 12 - 0 + 30 = 8$$

**Question 2. (6 marks)** A roof truss is in the shape of a right triangle. If there are 4.60m of lumber in the truss making the sides and the longest side is 2.20m long, what are the lengths of the other two sides of the truss?



$$a^2 + b^2 = 2.2^2$$

$$a + b + 2.2 = 4.60$$

$$\Rightarrow \begin{aligned} a^2 + b^2 &= 4.84 \\ a + b &= 2.4 \end{aligned}$$

$$\textcircled{2}: a = 2.4 - b$$

$$\therefore (2.4 - b)^2 + b^2 = 4.84$$

$$5.76 - 4.8b + b^2 + b^2 = 4.84$$

$$2b^2 - 4.8b + 0.92 = 0$$

$$\therefore b = \frac{-(-4.8) \pm \sqrt{(-4.8)^2 - 4(2)(0.92)}}{2(2)}$$

$$= \frac{4.8 \pm 3.959798}{4} = 2.19 \text{ or } 0.21$$

$$\therefore \begin{aligned} \text{IF } b &= 2.19 \\ a &= 2.4 - 2.19 \end{aligned}$$

$$= 2.19$$

or

$$b = 0.21$$

$$a = 2.4 - 0.21$$

$$= 2.19$$

\therefore THE SIDES ARE 2.19m AND 0.21m