

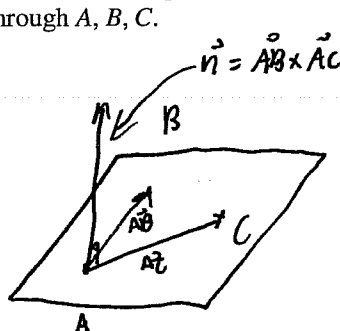
Quiz 9

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §3.3 #10 (2 marks) Find a point normal form of the equation of the plane passing through $P(-1, 3, -2)$ and having $\mathbf{n} = (-2, 1, -1)$.

$$\begin{aligned} a(x - x_0) + b(y - y_0) + c(z - z_0) &= 0 \\ -2(x - (-1)) + (y - 3) + (-1)(z - (-2)) &= 0 \\ -2x - 2 + y - 3 - z - 2 &= 0 \iff -2x + y - z - 7 = 0 \end{aligned}$$

Question 2. YP pg.3 #2c (5 marks) Let $A(1, -1, 0)$, $B(1, 0, 2)$, $C(-2, 0, 3)$ be three points in \mathbb{R}^3 . Find an equation for the plane passing through A , B , C .



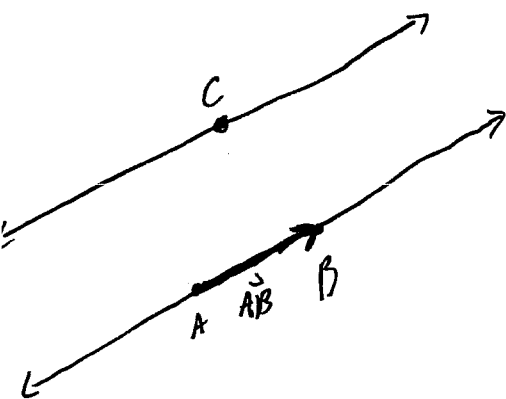
$$\begin{aligned} \vec{n} &= \vec{AB} \times \vec{AC} \\ \vec{AB} &= B - A = (1, 0, 2) - (1, -1, 0) = (0, 1, 2) \\ \vec{AC} &= C - A = (-2, 0, 3) - (1, -1, 0) = (-3, 1, 3) \\ \vec{n} &= \vec{AB} \times \vec{AC} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 0 & 1 & 2 \\ -3 & 1 & 3 \end{vmatrix} = \begin{vmatrix} 1 & 1 \\ 2 & 3 \end{vmatrix} \mathbf{i} - \begin{vmatrix} 0 & -3 \\ 2 & 3 \end{vmatrix} \mathbf{j} + \begin{vmatrix} 0 & 1 \\ -3 & 1 \end{vmatrix} \mathbf{k} \\ &= (1, -6, 3) \end{aligned}$$

So $ax + by + cz + d = 0$
 $x - 6y + 3z + d = 0$

sub $(1, -1, 0)$
 $1 - 6(-1) + 3(0) + d = 0$
 $d = -7$

$\therefore x - 6y + 3z - 7 = 0$

Question 3. YP pg.1 #1 (3 marks) Find the parametric equations of a line which passes through the point $C(6, 3, 0)$ and is parallel to the line which contains the points $A(6, -2, 3)$ and $B(7, 0, -3)$.



$$\begin{aligned} (x, y, z) &= C + t\vec{AB} \quad t \in \mathbb{R} \\ &= (6, 3, 0) + t(1, 2, -6) \\ &= (6+t, 3+2t, -6t) \end{aligned}$$

\therefore

$$\begin{aligned} x &= 6+t \\ y &= 3+2t \\ z &= -6t \end{aligned}$$

$$\begin{aligned} \vec{AB} &= B - A \\ &= (7, 0, -3) - (6, -2, 3) \\ &= (1, 2, -6) \end{aligned}$$