

# IB Mathematics HL 11

## Vectors Assignment

Complete the questions below and submit your work as a PDF file. You can email your work to [dmcdonald@mulgrave.com](mailto:dmcdonald@mulgrave.com), and you should submit your completed file before the end of the day on Monday, February 5th.

Consider the points  $A(-1, 0, 4)$ ,  $B(2, 1, -3)$ , and  $C(3, 3, 2)$ .

- a) Let  $L_1$  be the line passing through  $A$  and  $B$ . Find the vector equation of  $L_1$ .
- b) Let  $L_2$  be the line with Cartesian equation

$$\frac{x-2}{-1} = \frac{y-2}{2} = \frac{z}{-3}.$$

- i) Find the vector equation of  $L_2$ .
  - ii) Find the angle between  $L_1$  and  $L_2$ .
- c) Let  $\Pi_1$  be the plane parallel to both  $L_1$  and  $L_2$ , passing through  $C$ . Find the Cartesian equation of  $\Pi_1$ .
- d) Let  $\Pi_2$  be the plane containing  $L_1$ , orthogonal to  $\Pi_1$ . Find the Cartesian equation of  $\Pi_2$ .
- e) Consider the line  $L_3$  defined below.

$$L_3 : \vec{r} = \begin{bmatrix} -2 \\ -1 \\ 2 \end{bmatrix} + \lambda \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$$

Find the angle between  $L_3$  and  $\Pi_1$ .

- f) Create an image that clearly shows  $L_3$ ,  $\Pi_1$ , and their point of intersection.