

1. (pb. 16, section 12.4) Given the points $P(1, 1, 1)$, $Q(2, 1, 3)$, $R(3, -1, 1)$,

(a) Find the area of the triangle determined by P, Q, R .

(b) Find a unit vector perpendicular to the plane PQR .

2. (pb. 56, section 12.4) Determine if the points $A(0, 0, 4)$, $B(6, 2, 0)$, $C(2, -1, 1)$, $D(-3, -4, 3)$ are coplanar (that is, whether they all lie in the same plane).

3. (a) Show that if L is a line in 2-space or 3-space that passes through two given points A and B , then the distance from another given point P to the line L , is given by the formula

$$d(P, L) = \frac{|\overrightarrow{AP} \times \overrightarrow{AB}|}{|\overrightarrow{AB}|}.$$

(b) Apply the method above to find the distance between the point $P(1, 1, 1)$ and the line that passes through the points $A(1, 0, 0)$ and $B(0, 0, 3)$.

4. Use vectors to determine the acute angle formed by two diagonals of a cube. You could leave your answer as an inverse trigonometric function.