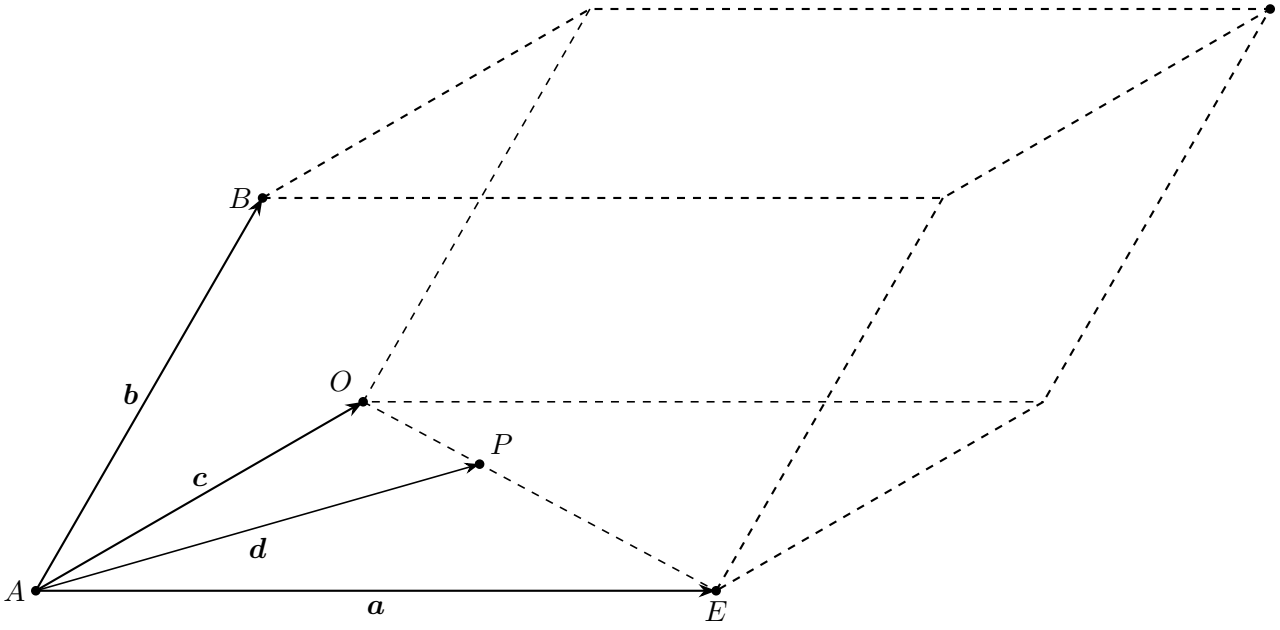
Applied Mathematics APM01A1, 2017

April 3, 2017

Tutorial 7

Question 1

Consider the parallelepiped below.



Given that $\boldsymbol{a} = 2\hat{x} - 4\hat{y} + \hat{z}, \boldsymbol{b} = 2\hat{x} + 3\hat{y} + 7\hat{z}, \boldsymbol{d} = \hat{x} - 2\hat{y} - \hat{z}$ and that $OP : PE = 1 : 2$, calculate the volume of the parallelepiped with sides, $\boldsymbol{a}, \boldsymbol{b}$ and $\boldsymbol{c}$.

Question 2

Find the equation of the plane that passes through the points $P = (1, 2, 3), Q = (1 - 2, 4)$ and $R = (-2, 5, 3)$.

Question 3

Calculate the shortest distance between the origin and points $P = (3, -2, -1)$, $Q = (1, 3, 4)$ and $R = (2, 1, -2)$.
Hint: First find the unit vector perpendicular to the plane using vectors

$$\begin{aligned} \overline{QP} &= 2\hat{x} - 5\hat{x} - 5\hat{z} \\ \overline{QR} &= \hat{x} - 2\hat{y} - 8\hat{z}. \end{aligned}$$