

Quiz 2: MATH 3503 Fall 2019

Find an equation for line perpendicular to the vectors $\vec{a} = \langle 1, 0, 0 \rangle$ and $\vec{b} = \langle 0, 1, 1 \rangle$ going thru $P = (1, 2, 3)$.

Soln: We need to find a vector \vec{v} parallel to the requested line. The cross product of two vectors yields a vector perpendicular to both.

Soln: Thus let

$$\vec{v} = \vec{a} \times \vec{b} = \det \begin{pmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 0 & 0 \\ 0 & 1 & 1 \end{pmatrix}$$

$$= \det \begin{pmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 0 & 0 \\ 0 & 1 & 1 \end{pmatrix} = \langle 0, -(1-0), 1-0 \rangle$$

$$= \langle 0, -1, 1 \rangle$$

Therefore the parametric equations for the requested line are

$$\begin{cases} x = 1 \\ y = 2 - t \\ z = 3 + t \end{cases}$$

outcomes in event = 3

outcomes total = 15

$$P(\text{Event}) = \frac{\# \text{ outcomes in event}}{\# \text{ outcomes total}} = \frac{3}{15} = \frac{1}{5}$$