

"QUIZ" for Lecture 1

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1. Show that the triangle with vertices $P = (1, 0, 0)$, $Q = (0, 1, 0)$, and $R = (0, 0, 1)$ is an equilateral triangle.

$$\text{dist}(PQ) = \sqrt{(0-1)^2 + (1-0)^2 + (0-0)^2} = \sqrt{2}$$

$$\text{dist}(PR) = \sqrt{(1-0)^2 + (0-1)^2 + (1-0)^2} = \sqrt{2}$$

$$\text{dist}(QR) = \sqrt{(0-0)^2 + (0-1)^2 + (1-0)^2} = \sqrt{2}$$

all distances equal $\sqrt{2}$ so each side length is equal

2. Determine whether the following two lines ever meet. If they do meet, where?

$$\mathbf{r}_1(t) = \langle 1, 0, 0 \rangle + t\langle 1, 2, 3 \rangle, \quad \mathbf{r}_2(t) = \langle 0, 1, 0 \rangle + t\langle 2, 1, 3 \rangle$$

$$\mathbf{r}_1 = \langle 1, 0, 0 \rangle + t\langle 1, 2, 3 \rangle \quad \mathbf{r}_2 = \langle 0, 1, 0 \rangle + t\langle 2, 1, 3 \rangle$$

$$\mathbf{r}_1 = \langle 1+t, 2t, 3t \rangle \quad \mathbf{r}_2 = \langle 2t, 1+t, 3t \rangle$$

$$\mathbf{r}_2 = \langle 2s, 1+s, 3s \rangle$$

$$t = 1 = s \rightarrow (1+1, 2(1), 3(1))$$

point $(2, 2, 3)$
where they meet

$$= \begin{array}{c|c|c} 1+t=2s & 2t=1+s & 3t=3s \\ \hline 1+t=2t & 2t=1+t & t=s \end{array}$$