1. Show that the $\triangle$ w/ vertices $P = (1,0,0)$, $Q = (0,1,0)$, & $R = (0,0,1)$ is an equilateral $\triangle$.

$$\text{dist}(P,Q) = \sqrt{(1-0)^2 + (0-1)^2 + (0-0)^2} = \sqrt{2}$$
$$\text{dist}(P,R) = \sqrt{(1-0)^2 + (0-0)^2 + (0-1)^2} = \sqrt{2}$$
$$\text{dist}(Q,R) = \sqrt{(0-0)^2 + (0-1)^2 + (1-0)^2} = \sqrt{2}$$

All 3 sides of $\triangle PQR$ have the same length ($\sqrt{2}$).
$\Rightarrow \triangle$ is equilateral

2. Determine whether the following 2 lines ever meet. If they do meet, where?
$$r_1(t) = \langle 1,0,0 \rangle + t\langle 1,2,3 \rangle \quad , \quad r_2(t) = \langle 0,1,0 \rangle + t\langle 2,1,3 \rangle$$

$$r_1(t) = \langle 1,0,0 \rangle + t\langle 1,2,3 \rangle \quad , \quad r_2(s) = \langle 0,1,0 \rangle + s\langle 2,1,3 \rangle$$
$$r_1(t) = \langle 1+t, 2t, 3t \rangle \quad , \quad r_2(s) = \langle 2s, 1+s, 3s \rangle$$
$$r_1(t) = r_2(s)$$

$1+t = 2s \quad , \quad 2t = 1+s \quad\longleftrightarrow\quad 3t = 3s$
$\qquad\qquad 2(1) = 1+1 \qquad\qquad t=1 , \ s=1 \quad$ (LINES MEET)

To find where lines meet, plug-in $t=1$ into $r_1(t)$
$$r_1(1) = \langle 1+t, 2\cdot1, 3\cdot1 \rangle = \langle 2,2,3 \rangle$$

To be safe, plug-in $s=1$ into $r_2(s)$
$$r_2(1) = \langle 2,2,3 \rangle$$

BEWARE: convert vector into a point
The 2 lines do intersect each other, & the intersection pt. is:
$$(2,2,3)$$