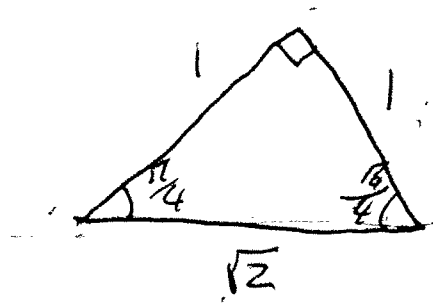


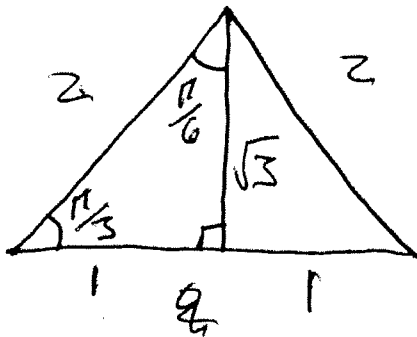
# Special Angles



$$\sin \frac{\pi}{4} = \frac{1}{\sqrt{2}}$$

$$\cos \frac{\pi}{4} = \frac{1}{\sqrt{2}}$$

$$\tan \frac{\pi}{4} = \frac{1}{1} = 1$$



$$\sqrt{2^2 - 1^2} = \sqrt{3}$$

$$\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2} = \cos \frac{\pi}{6}$$

$$\cos \frac{\pi}{3} = \frac{1}{2} = \sin \frac{\pi}{6}$$

$$\tan \frac{\pi}{3} = \sqrt{3}$$

$$\tan \frac{\pi}{6} = \frac{1}{\sqrt{3}}$$

$$2x + 3y = 4$$

Does  $(1, 2)$  lie on this line?

$$2 \times 1 + 3 \times 2 = 8 \neq 4 \quad \text{So No.}$$

Does  $(2, 0)$  lie on this line?

$$2 \times 2 + 3 \times 0 = 4 \quad \checkmark \quad \text{Yes.}$$

Consider  $4x + 6y = 8$

$$\begin{array}{l} \Rightarrow \\ \uparrow \\ \text{if and only if} \end{array} \quad 2(2x + 3y) = 2 \times 4$$

Same line!

$$x + 2y + 3z = -2$$

Does  $(1, 1, 1)$  lie on this plane

$$1 + 2 + 3 = 6 \neq -2 \quad \text{No}$$

$$(0, -1, 0)$$

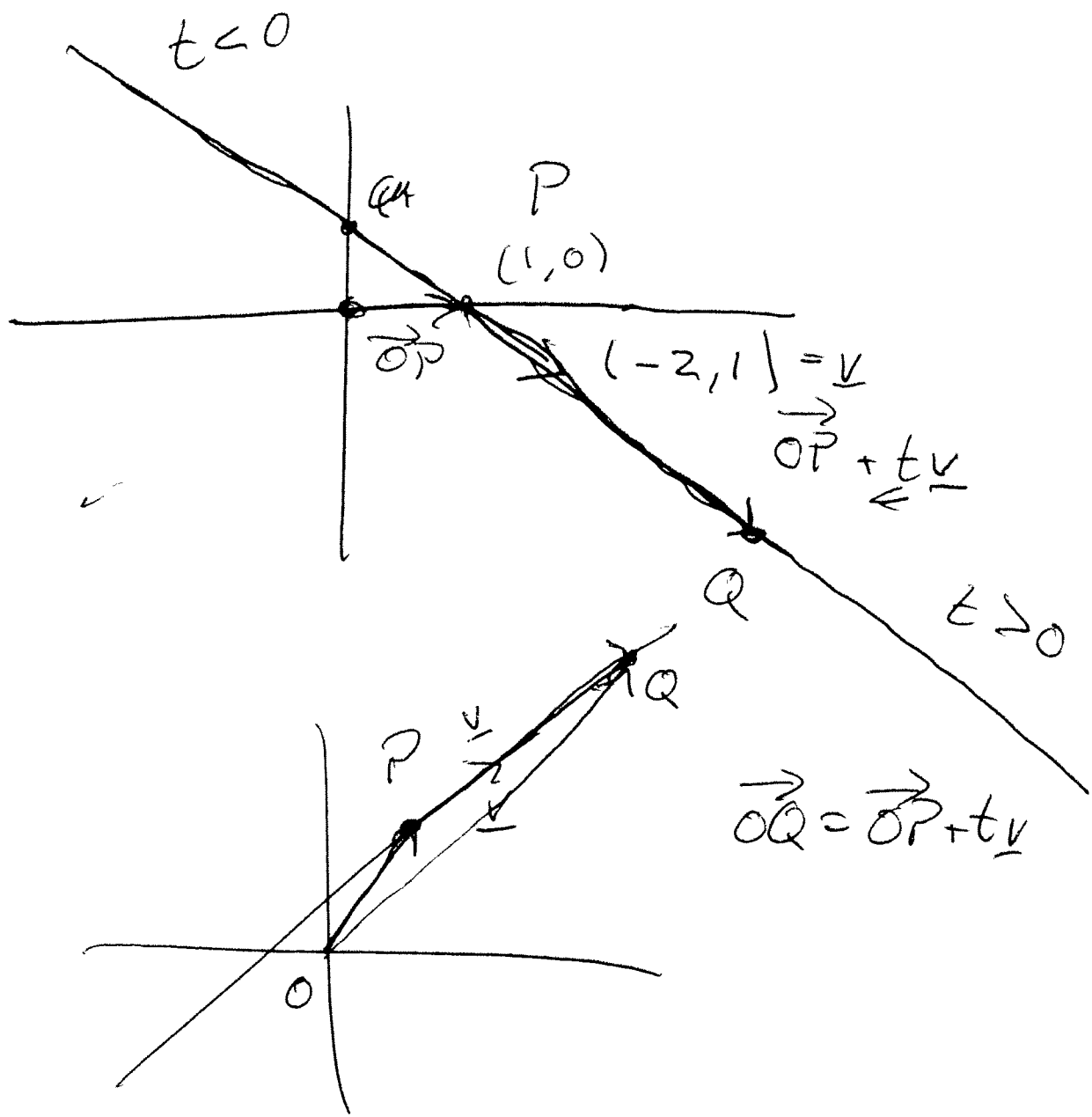
$$0 + 2(-1) + 0 = -2 \quad \checkmark \quad \text{Yes}$$

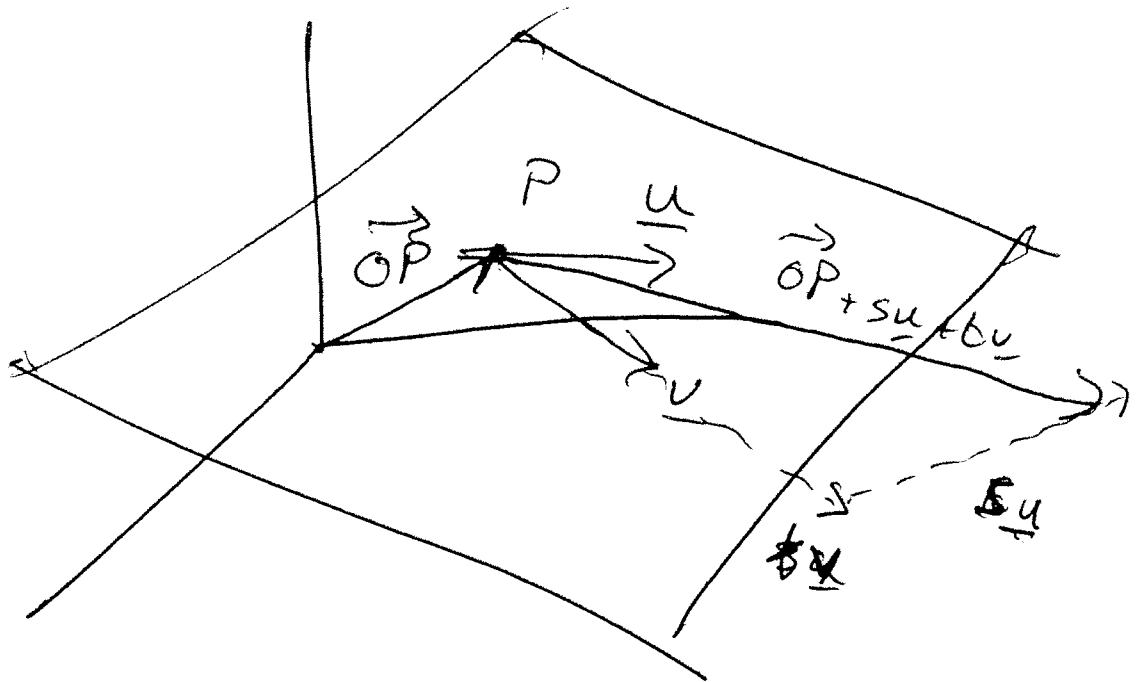
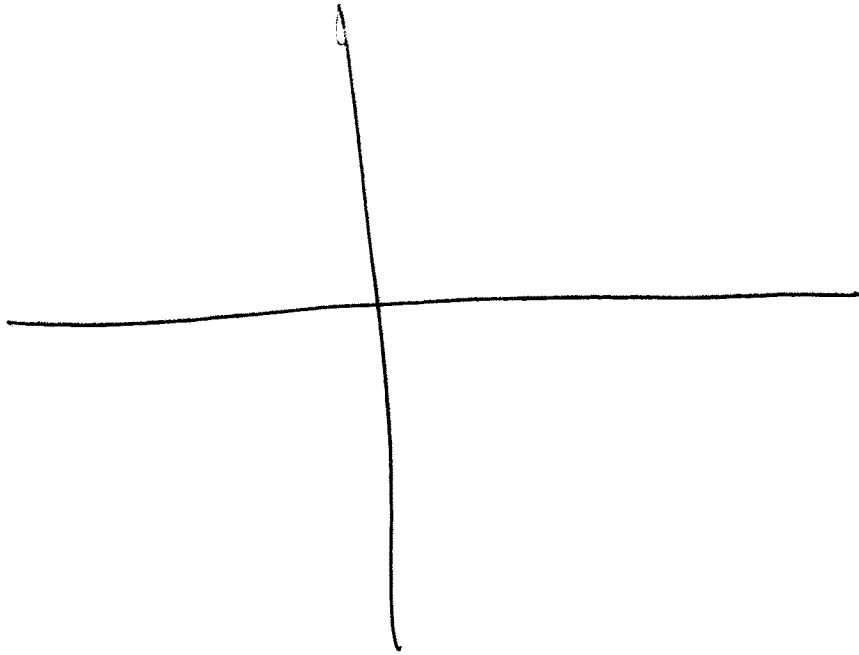
$$x - y + 2z + w = 0$$

Does  $(1, 1, 1, 1)$  lie on this hyperplane?

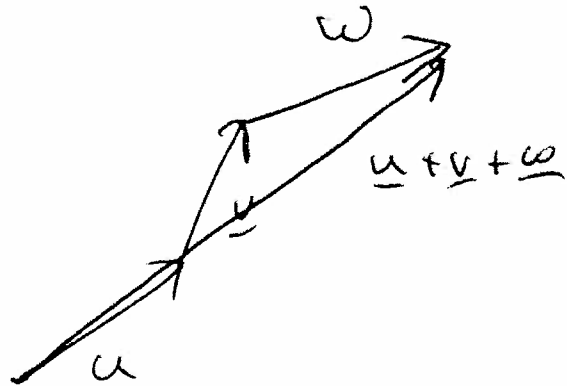
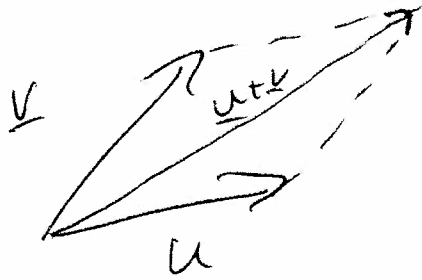
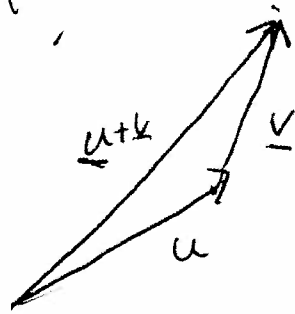
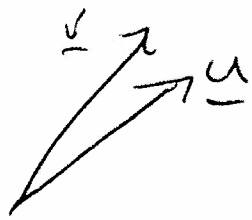
$$1 - 1 + 2 + 1 = 3 \neq 0 \quad \text{So No}$$

Does  $(1, 1, 0, 0)$  Yes.

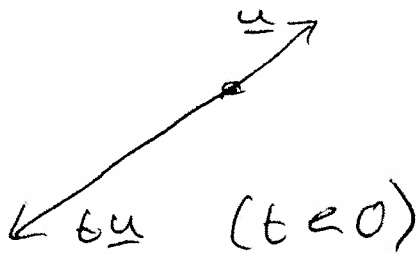
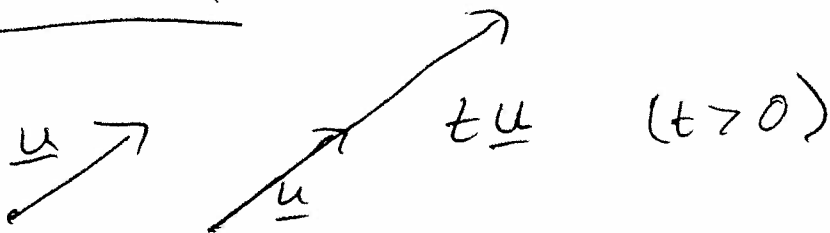




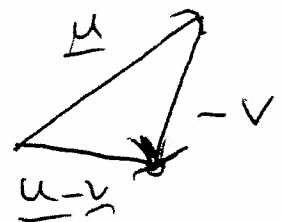
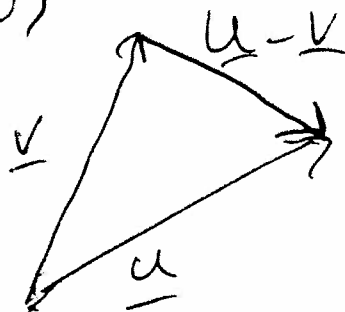
# Geometric Vector Addition

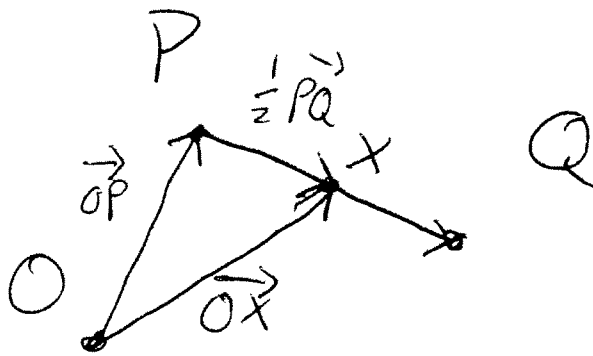


# Scalar Mult<sup>n</sup>



# Subtract<sup>n</sup>





$$P = (1, 1, 2) \quad Q = (2, 1, -1)$$

Find the vector  $\frac{1}{2}$  way from  $P$  to  $Q$

$$\vec{OX} = \vec{OP} + \frac{1}{2}\vec{PQ}$$

$$\begin{aligned} \vec{PQ} &= (1, 0, -3) \\ \vec{OX} &= (1, 1, 2) + \frac{1}{2}(1, 0, -3) \\ &= \left(\frac{3}{2}, 1, \frac{7}{2}\right) \\ &= \frac{1}{2}(3, 2, 7) \end{aligned}$$