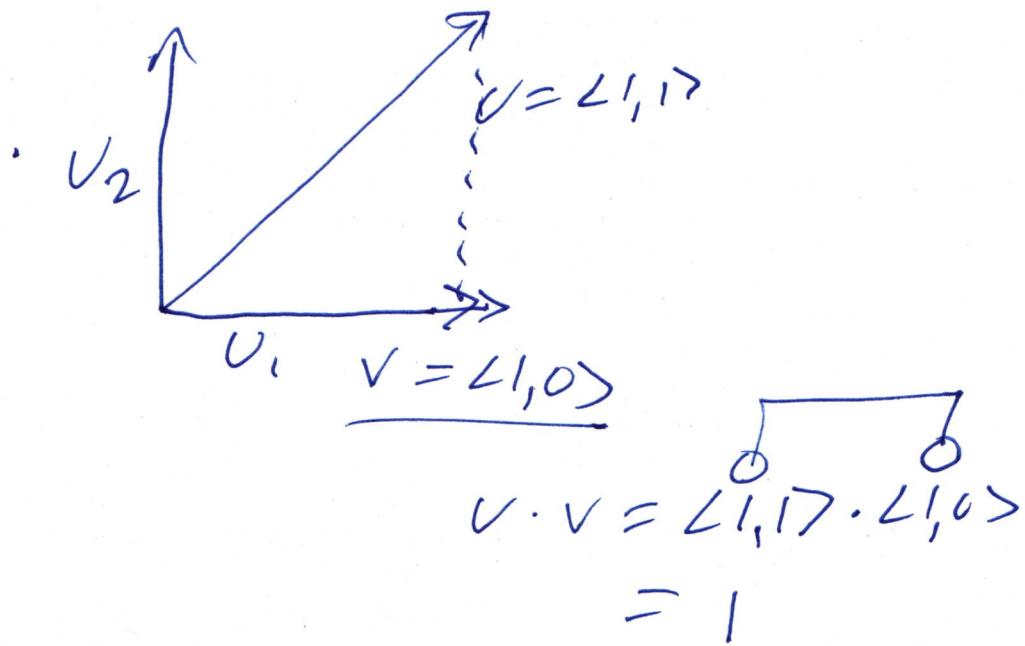


Slide 1

2/11

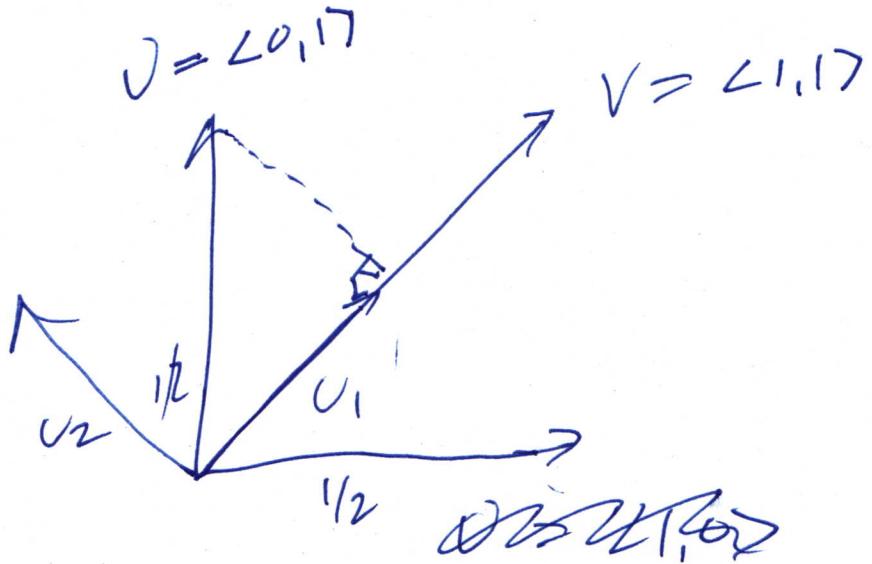


rectilinear vectors  
aligned with axes

$$v_1 = \langle 1, 0 \rangle$$

$$v_2 = \langle 0, 1 \rangle$$

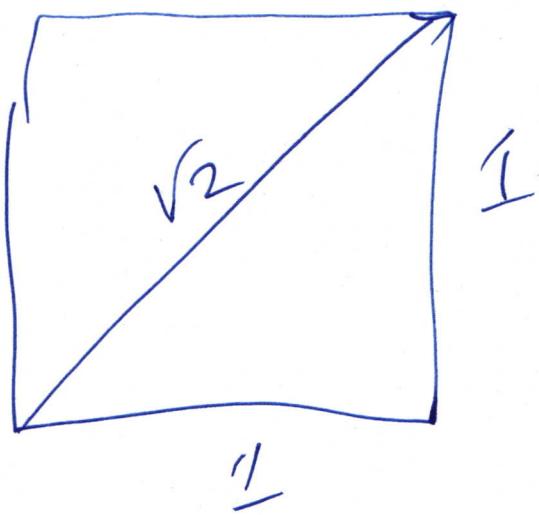
SLide 2



$$U_1 = \frac{\langle 0, 1 \rangle \cdot \langle 1, 1 \rangle / \langle 1, 1 \rangle \cdot \langle 1, 1 \rangle}{\langle 1, 1 \rangle \cdot \langle 1, 1 \rangle}$$
$$= \left\langle \frac{1}{2}, \frac{1}{2} \right\rangle$$

$$U_2 = V - U_1 = \langle 0, 1 \rangle - \left\langle \frac{1}{2}, \frac{1}{2} \right\rangle$$
$$= \left\langle -\frac{1}{2}, \frac{1}{2} \right\rangle$$

Sl. k 3



# Slide 4

• TRS

• Two cases

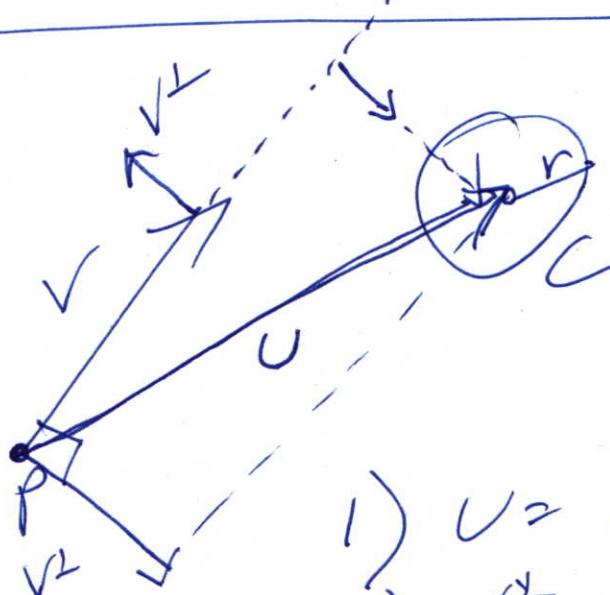
$$p(t) = Lp_x + t\psi_x,$$

$$p_y + t\psi_y >$$



$$x^2 + y^2 = R$$

• Orthogonal projection

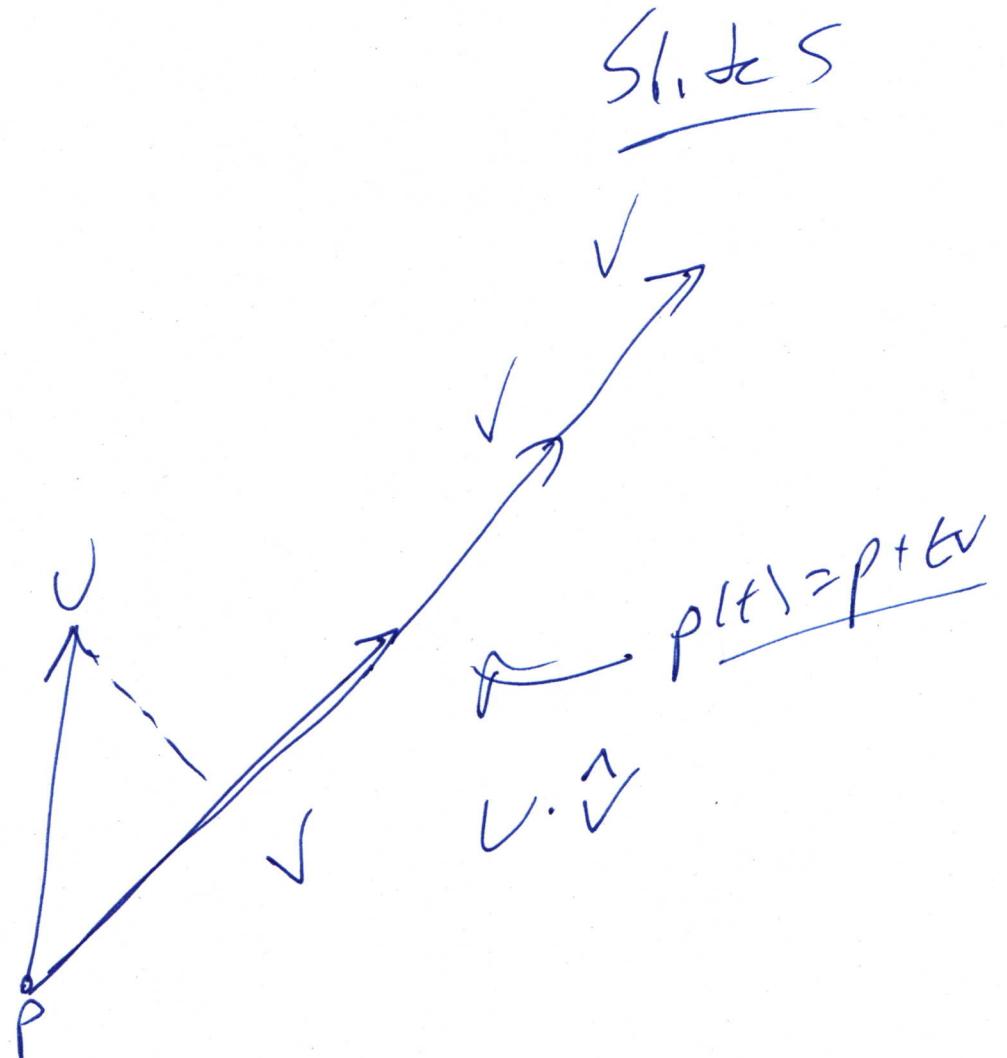


$$1) \quad v = c - p$$

$$2) \quad v^\perp = \text{perp of } v$$

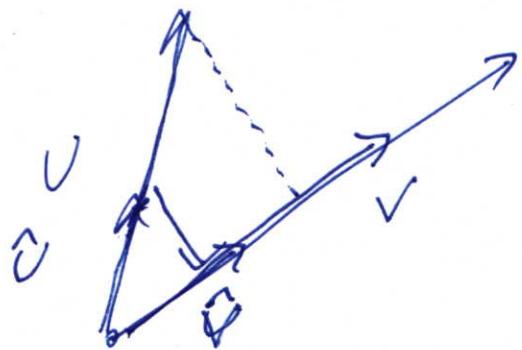
$$3) \quad v^\perp = \frac{v^\perp}{\|v^\perp\|}$$

$$4)$$



$$\rho(t) = \rho + t\sqrt{v}$$

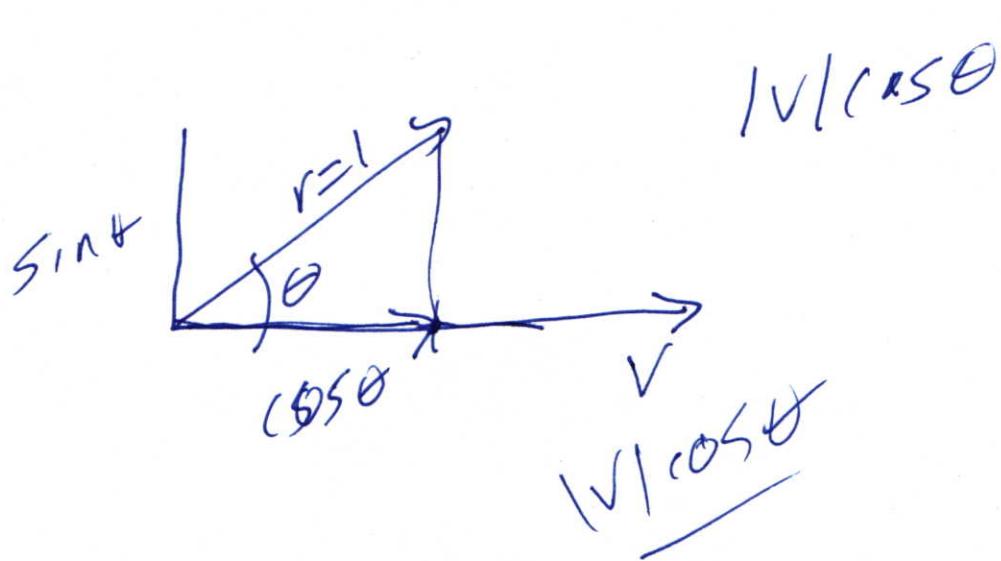
# Slide 6



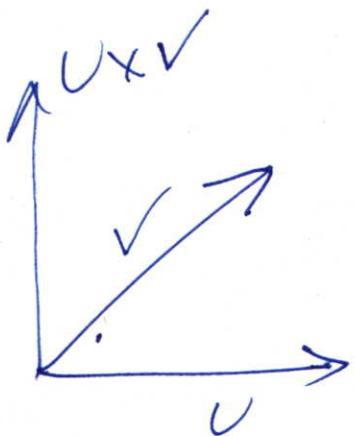
$$\begin{aligned} \mathbf{v} \cdot \mathbf{w} &= (\|\mathbf{v}\| \hat{\mathbf{v}}) \cdot (\|\mathbf{w}\| \hat{\mathbf{w}}) \\ &= \underline{\|\mathbf{v}\| \|\mathbf{w}\|} \hat{\mathbf{v}} \cdot \hat{\mathbf{w}} \end{aligned}$$

$$\mathbf{v} \cdot \hat{\mathbf{w}} = \|\mathbf{v}\| \underline{\hat{\mathbf{v}} \cdot \hat{\mathbf{w}}}$$

$$\mathbf{v} \cdot \mathbf{w} = \underline{\|\mathbf{v}\| \|\mathbf{w}\| \cos \theta}$$



# Slide 7



$$\begin{aligned}e_x &= \langle 1, 0, 0 \rangle \\e_y &= \langle 0, 1, 0 \rangle \\e_z &= \langle 0, 0, 1 \rangle\end{aligned}$$

Calculating The cross product

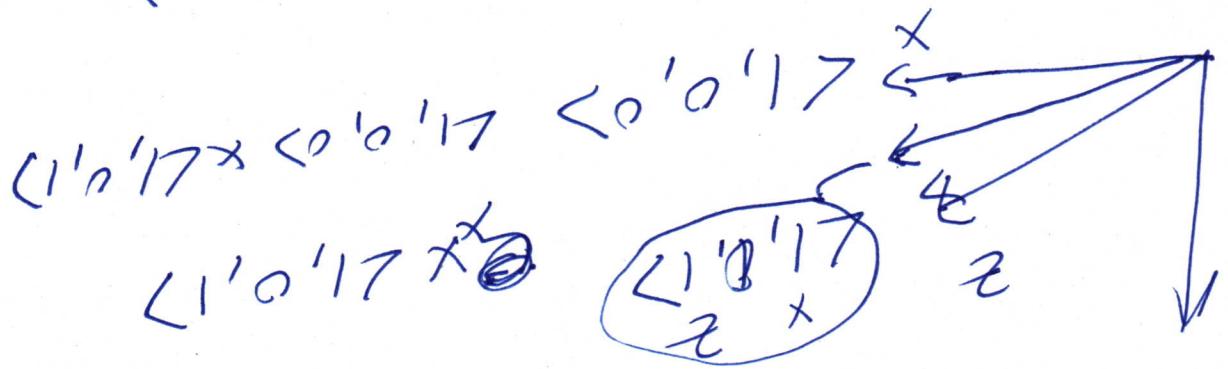
$$\begin{aligned}\vec{U} \times \vec{V} &= \begin{vmatrix} \vec{e}_x & \vec{e}_y & \vec{e}_z \\ U_x & U_y & U_z \\ V_x & V_y & V_z \end{vmatrix} \\&= \vec{e}_x \begin{vmatrix} U_y & U_z \\ V_y & V_z \end{vmatrix} - \vec{e}_y \begin{vmatrix} U_x & U_z \\ V_x & V_z \end{vmatrix} \\&\quad + \overset{s}{\vec{e}_z} \begin{vmatrix} U_x & U_y \\ V_x & V_y \end{vmatrix} \\&= e_x (U_y V_z - V_y U_z) \\&\quad - e_y (U_x V_z - V_z U_x) \\&\quad + e_z (U_x V_y - V_y U_x)\end{aligned}$$

$$e_y = \begin{vmatrix} 1 & 0 & 1 \\ 0 & 0 & 1 \\ e_x & e_y & e_z \end{vmatrix} \quad (2)$$

$$e_z = \begin{vmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ e_x & e_y & e_z \end{matrix}$$

$$e_x + e_y \cdot e_z =$$

$$\langle 0, 1, 0 \rangle \times \langle 0, 0, 1 \rangle = \overline{h_x \times z} \quad (1)$$

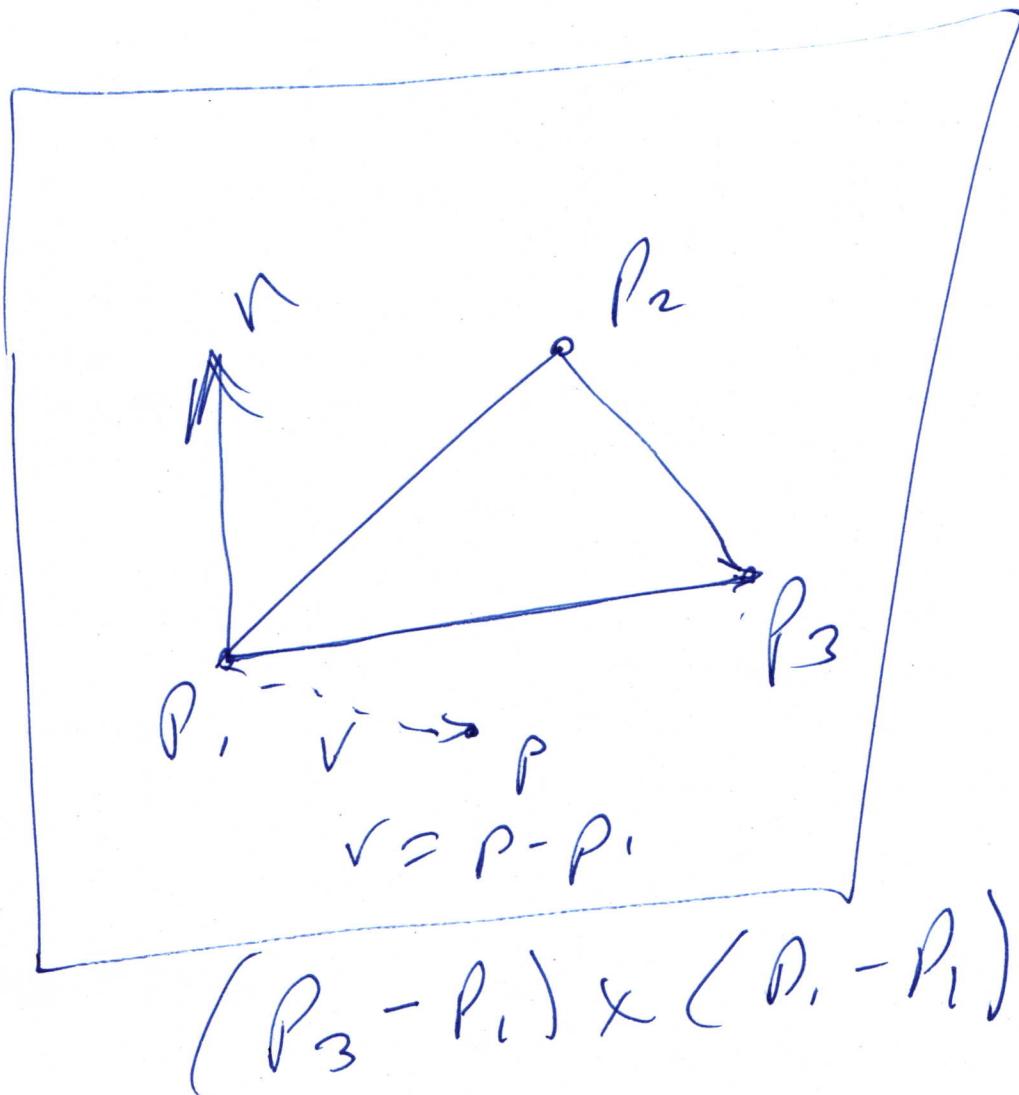


$$\overline{z} = h \times x$$

Diagram illustrating the relationship between vectors  $z$ ,  $h$ , and  $x$  as components of a right-angled triangle.

8 28.15

Slide 9



$$n \cdot v = 0$$

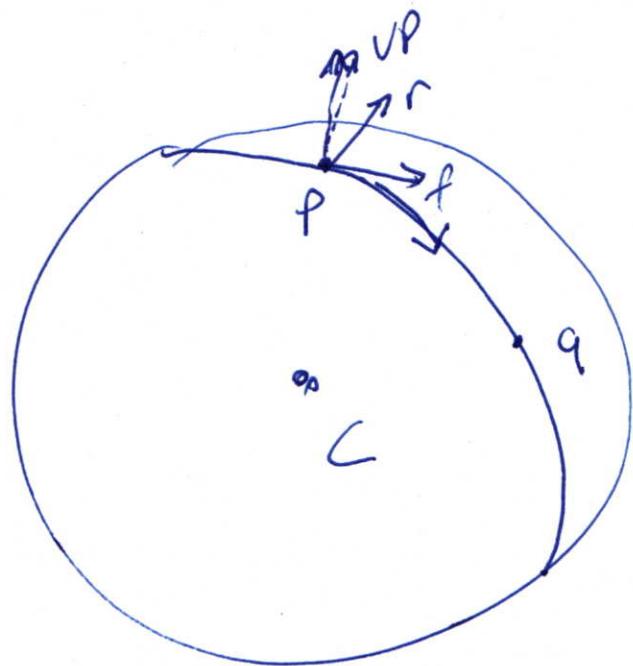
$$n \cdot (p - p_1) = 0$$

$$n \cdot p - n \cdot p_1 = 0$$

$\frac{1}{L}$  constant

$$n \cdot p = n \cdot p_1$$

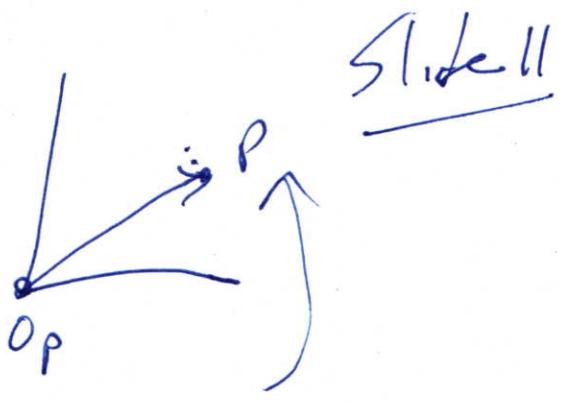
Sl. 1c 10



$$\hat{v}_P = \frac{P - C}{|P - C|}$$

A diagram of a circle with center labeled 'C'. A point 'P' is on the circumference, and a point 'Q' is inside the circle. A vector 'r' is drawn from the center 'C' to the point 'P'. A vector 'f'' is drawn from 'P' to 'Q'. A vector  $\hat{r}$  is shown as the cross product of  $\hat{v}_P$  and  $f'$ .

$$f' = \frac{q - p}{|q - p|}$$
$$\hat{r} = \underline{\hat{v}_P \times f'}$$
$$\hat{f} = \underline{r \times \hat{v}_P}$$



St.ell 11

$$P = (x, y, 1)$$

$$= x \vec{v}_0 + y \vec{v}_1 + 1 \cdot \vec{O_P}$$

$$\nabla = P_1 - P_2$$

$$= (x_1, y_1, 1) - (x_2, y_2, 1)$$

$$= \langle x_1 - x_2, y_1 - y_2, \underline{0} \rangle$$

$$\nabla = P \text{ minus } P$$

$$P = \nabla + P$$

$$P + P = \langle x_1, y_1, 1 \rangle$$

$$+ \langle x_2, y_2, 1 \rangle$$

$$= \langle x_1 + x_2, y_1 + y_2, 2 \rangle$$