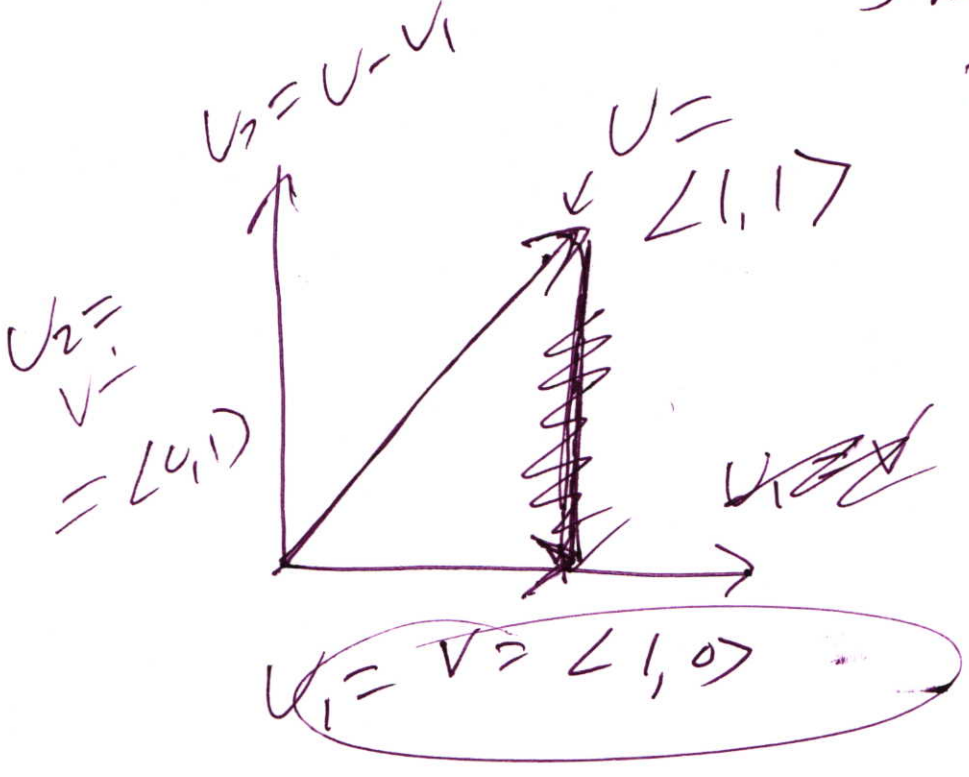
Notes

CMSC425 Sept. 20th

Orthogonal projection example

Slide 1

SIMPLE CASE - TEST W/ VALUES THAT GIVE CLEAR ANSWER



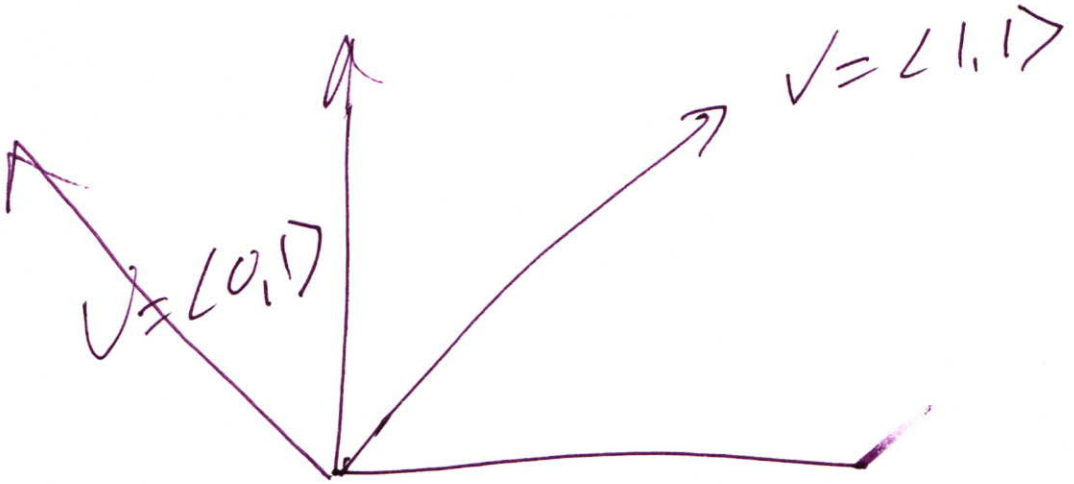
$U \cdot V = 1$

$$U_1 = \frac{U \cdot V}{(V \cdot V)} V = \frac{1}{1} \langle 1,0 \rangle$$

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

$$U_2 = U - U_1 = \langle 0,1 \rangle$$

orthogonal projection example



$$u_1 = \frac{u \cdot v}{v \cdot v} v = \frac{\langle 0,1\rangle \cdot \langle 1,1\rangle}{2} \langle 1,1\rangle$$

$$= \langle 1,1\rangle / 2$$

$$u_2 = u - u_1$$

$$= \langle 0,1\rangle - \langle \tfrac{1}{2}, \tfrac{1}{2}\rangle$$

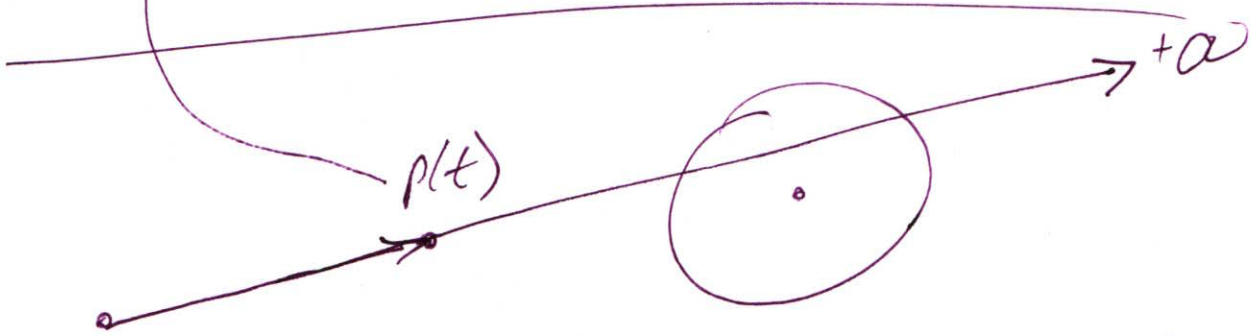
$$= \langle -\tfrac{1}{2}, \tfrac{1}{2}\rangle$$

IMPLICIT

① $(x - x_C)^2 + (y - y_C)^2 = r^2$

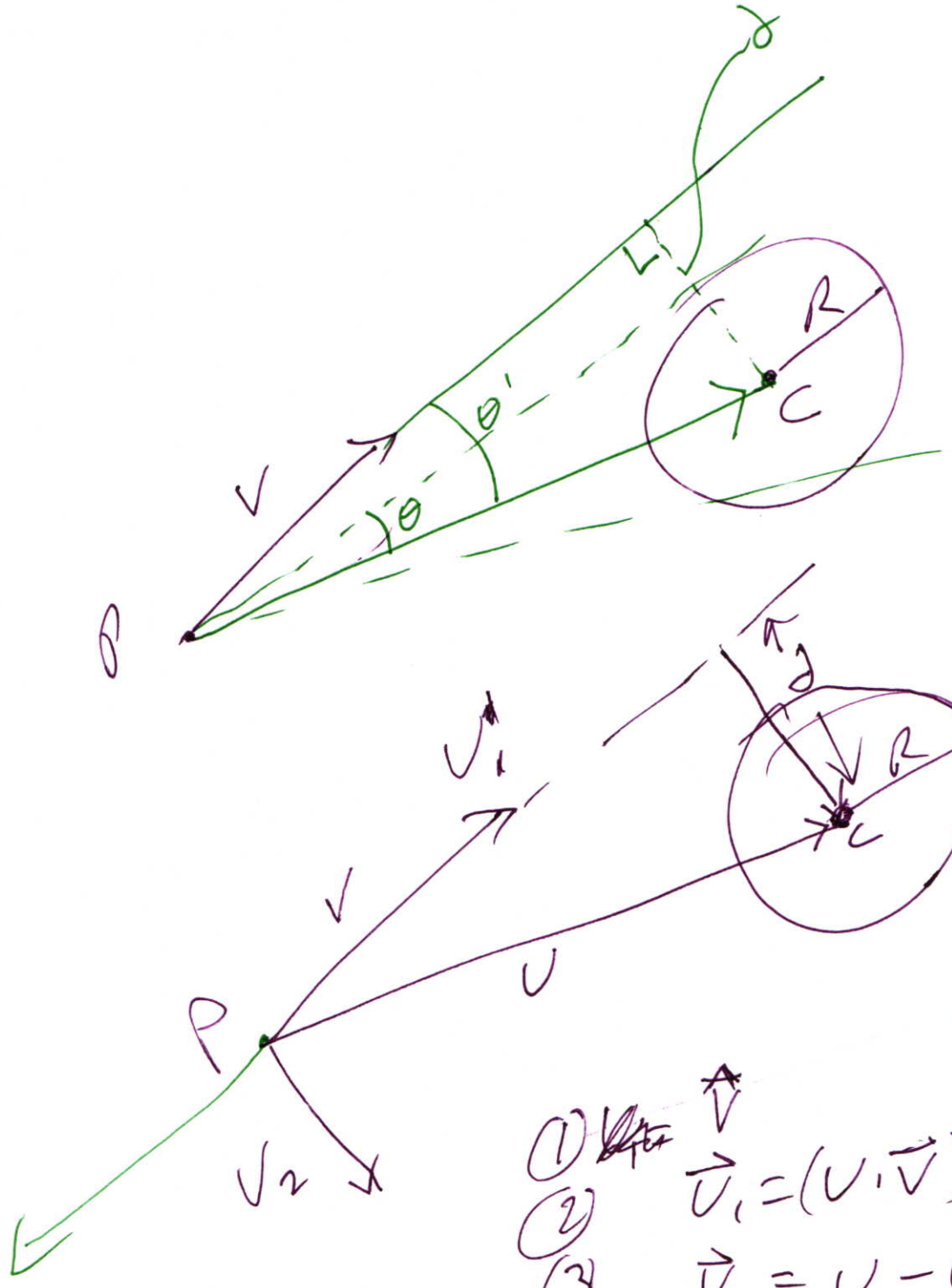
② $p(t) = p + tv$

$= \langle p_x + tv_x, p_y + tv_y \rangle$



$(p_x + tv_x - x_C)^2 + (p_y - tv_y - y_C)^2 = r^2$

Slide 4



$\vec{V}$ normalized

① $\vec{v}$

② $\vec{v}_1 = (U \cdot \vec{v})\vec{v}$

③ $\vec{v}_2 = U - v_1$

④ $|\vec{v}_2| < R$

Slides

```
Vector3 P;
Vector3 C;
float   R;
Vector3 V;
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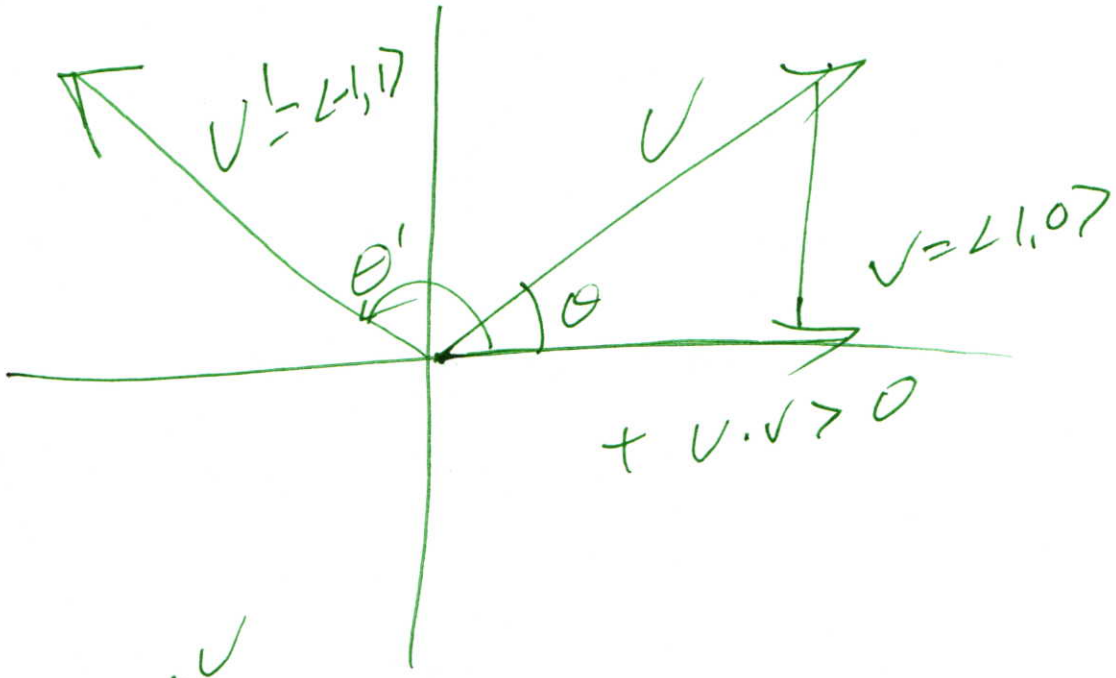
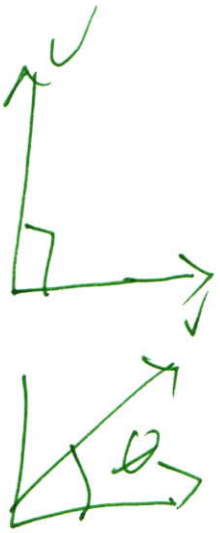
```
V = V.normalize;
Vector3 U1 = V3.dot(U,V) * V;
Vector3 U2 = U - U1;
float d = V.magnitude;
if (d < R) then true
else false
```

Vector3 U = C - P;





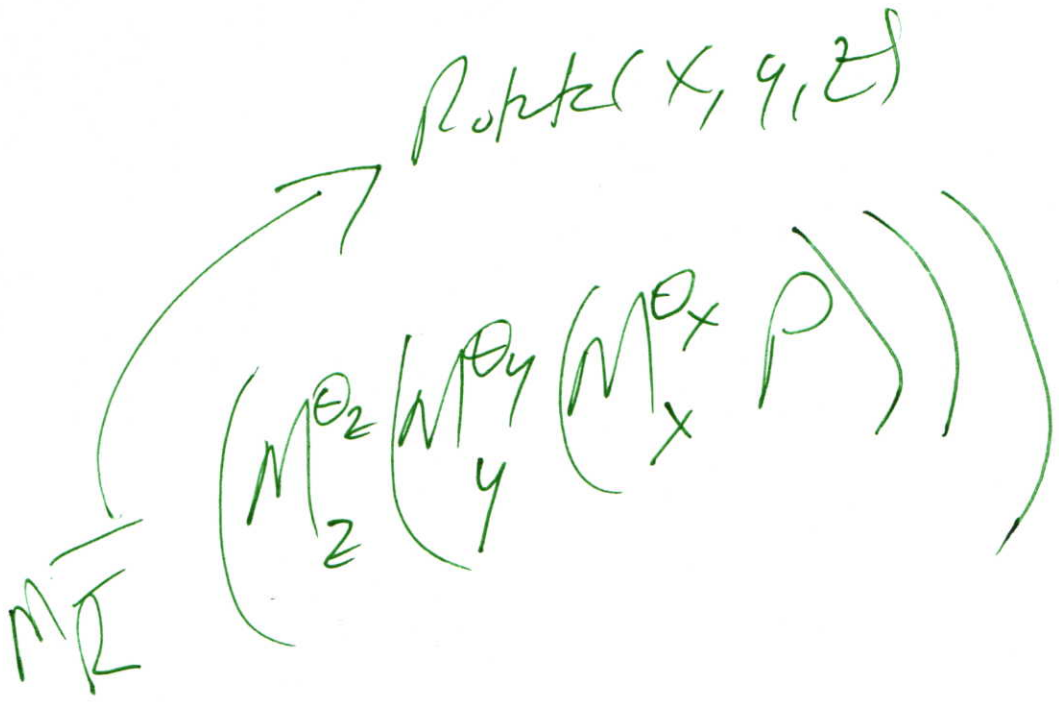
$v \cdot v = 0$

$v \cdot v > 0 \Rightarrow \theta < 90$

$v \cdot v < 0 \Rightarrow \theta > 90$

acute

obtuse


Robot(x, y, z)
$M_z^{\theta_z}$
$M_y^{\theta_y}$
$M_x^{\theta_x}$
P