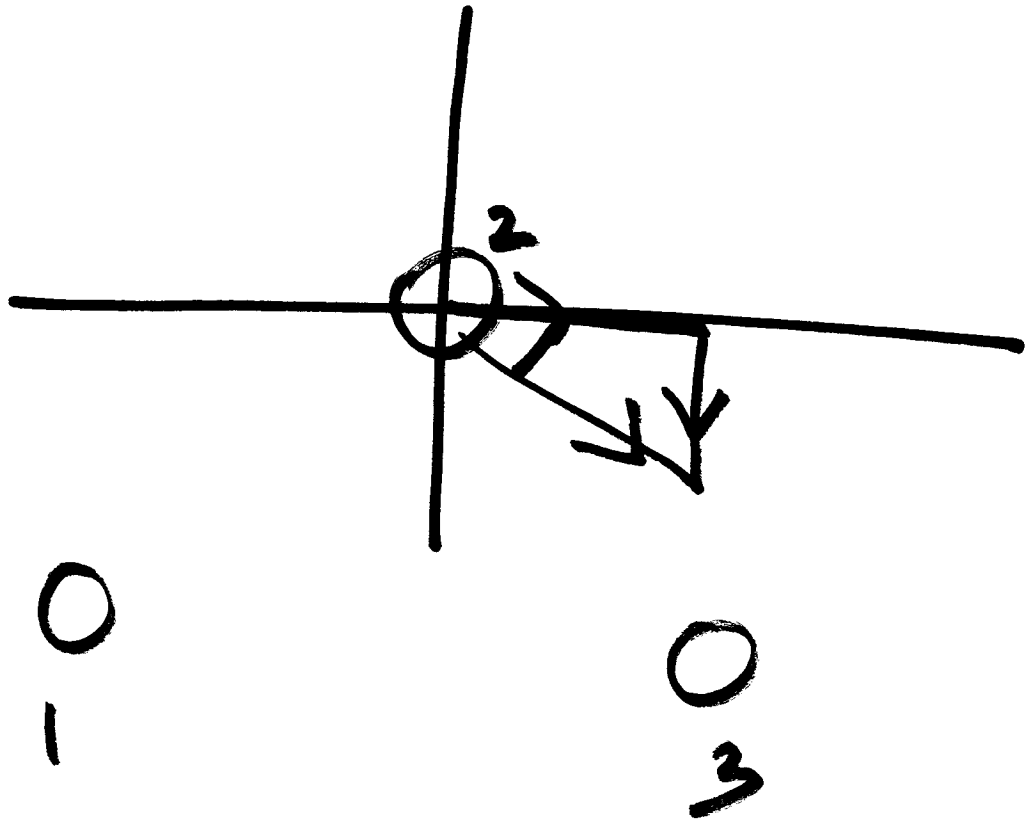
Prof. Ranjith. P
Lec. 16 (29/9/11)

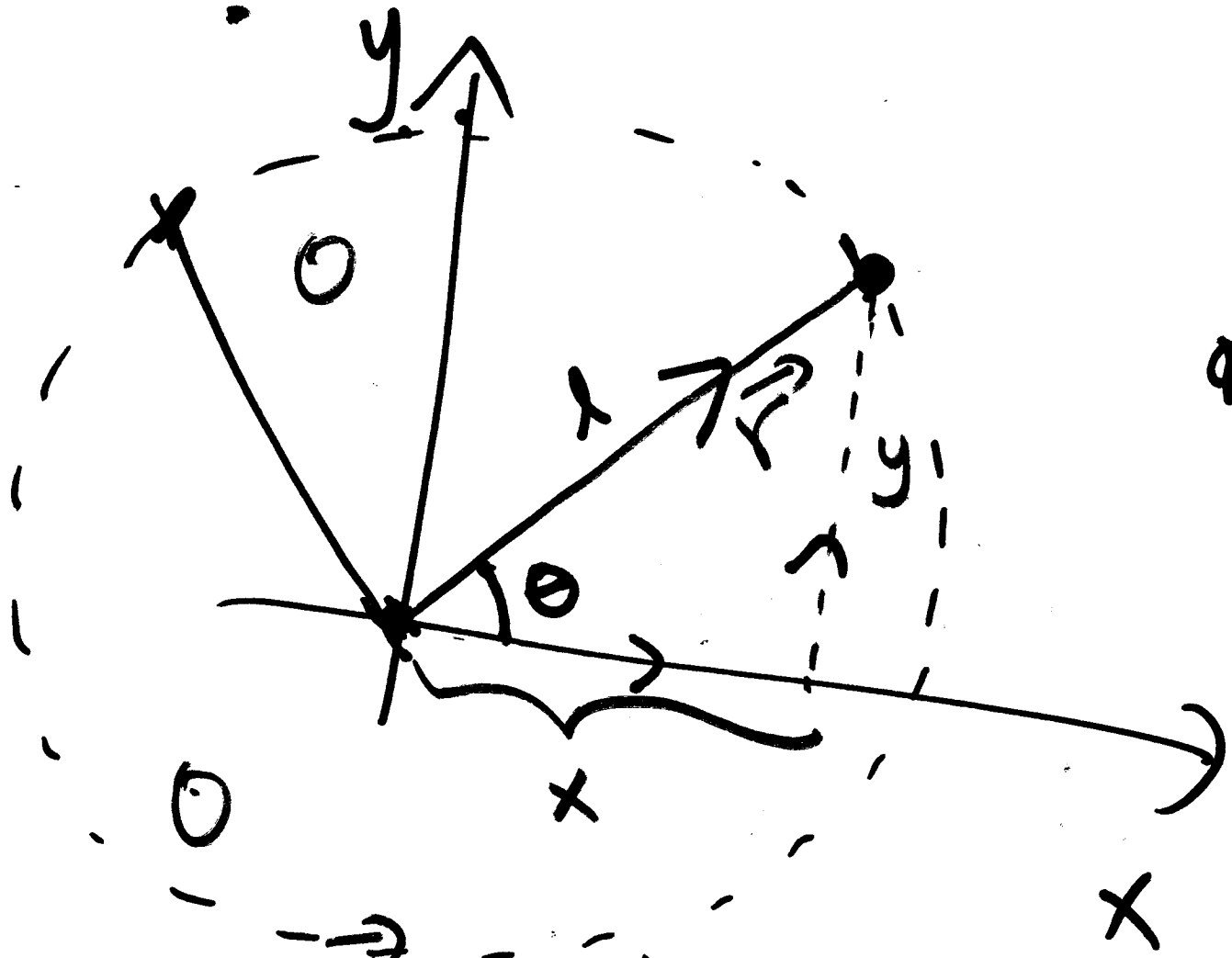
(1)

first

$$\vec{f_2} = \alpha \hat{x} - \beta \hat{y}$$



$$\vec{A} = a_1\hat{x} + a_2\hat{y} + a_3\hat{z}$$

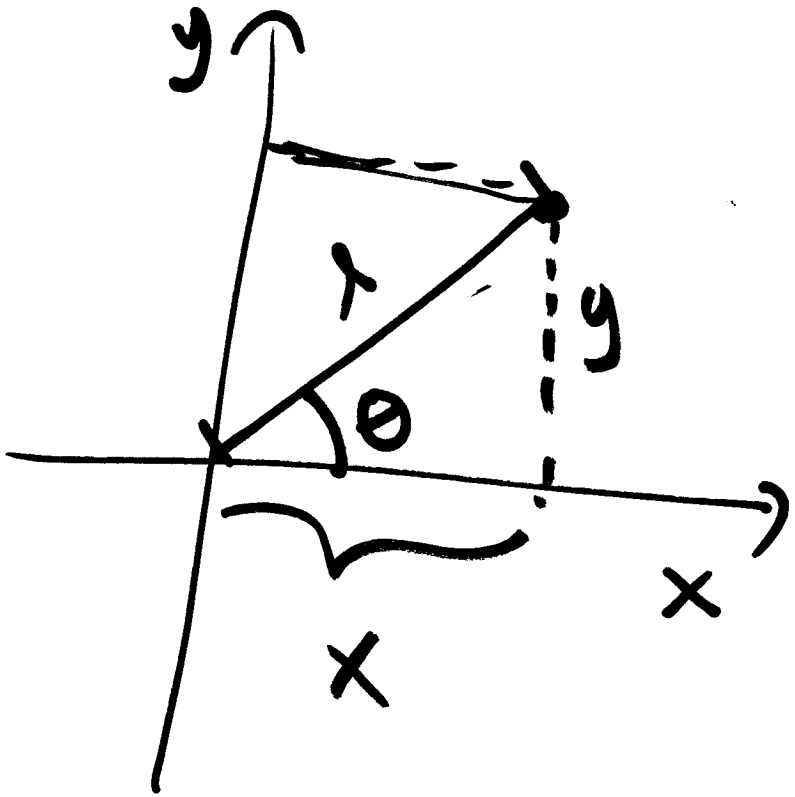


$\vec{r} = x\hat{x} + y\hat{y}$

$r = |\vec{r}|$

x, y

~~$\vec{r} = x\hat{e}_x + y\hat{y}$~~



(r, θ) (r, θ)

$r = r$

(x, y)

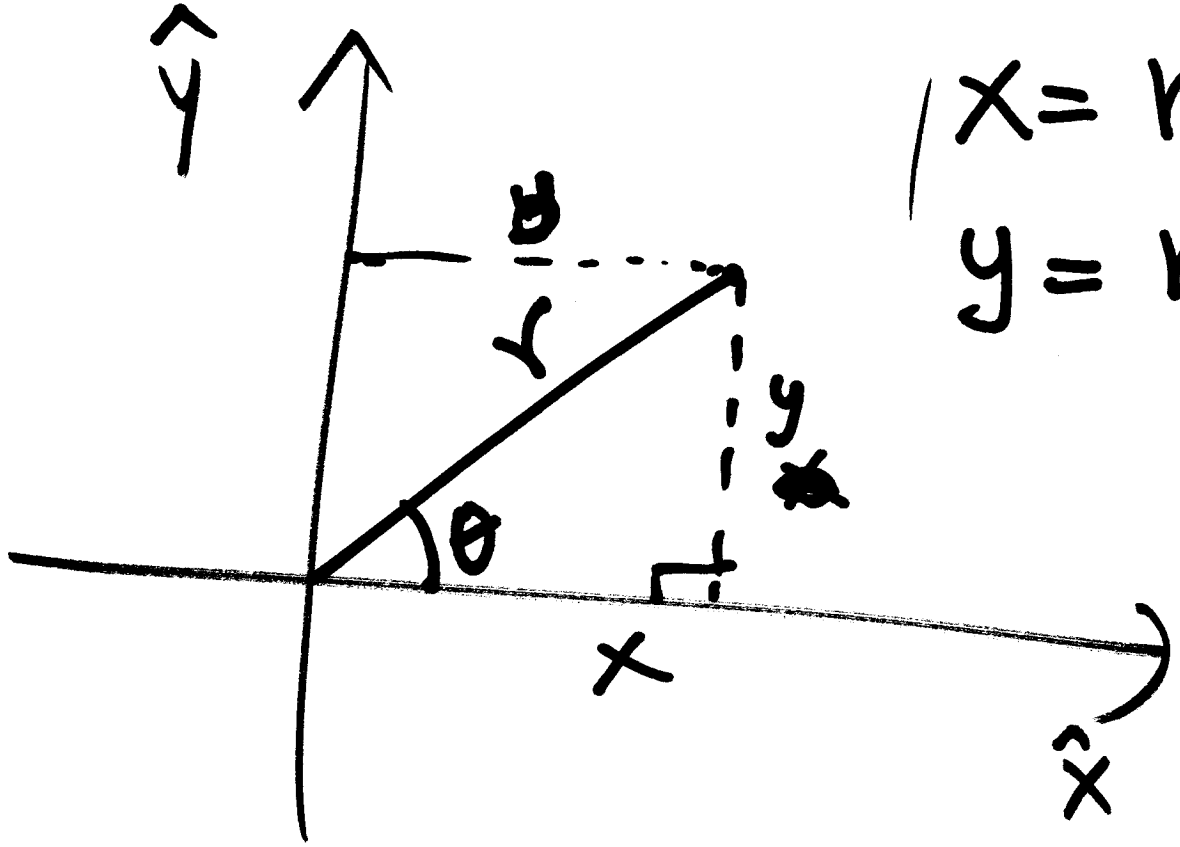
$$\vec{r} = x\,\hat{x} + y\,\hat{y}$$

$$\cos\theta = \frac{x}{r}$$

$$\boxed{x = r\cos\theta}$$

$$\sin\theta = \frac{y}{r} \Rightarrow \boxed{y = r\sin\theta}$$

~~$x = r\sin\theta$~~

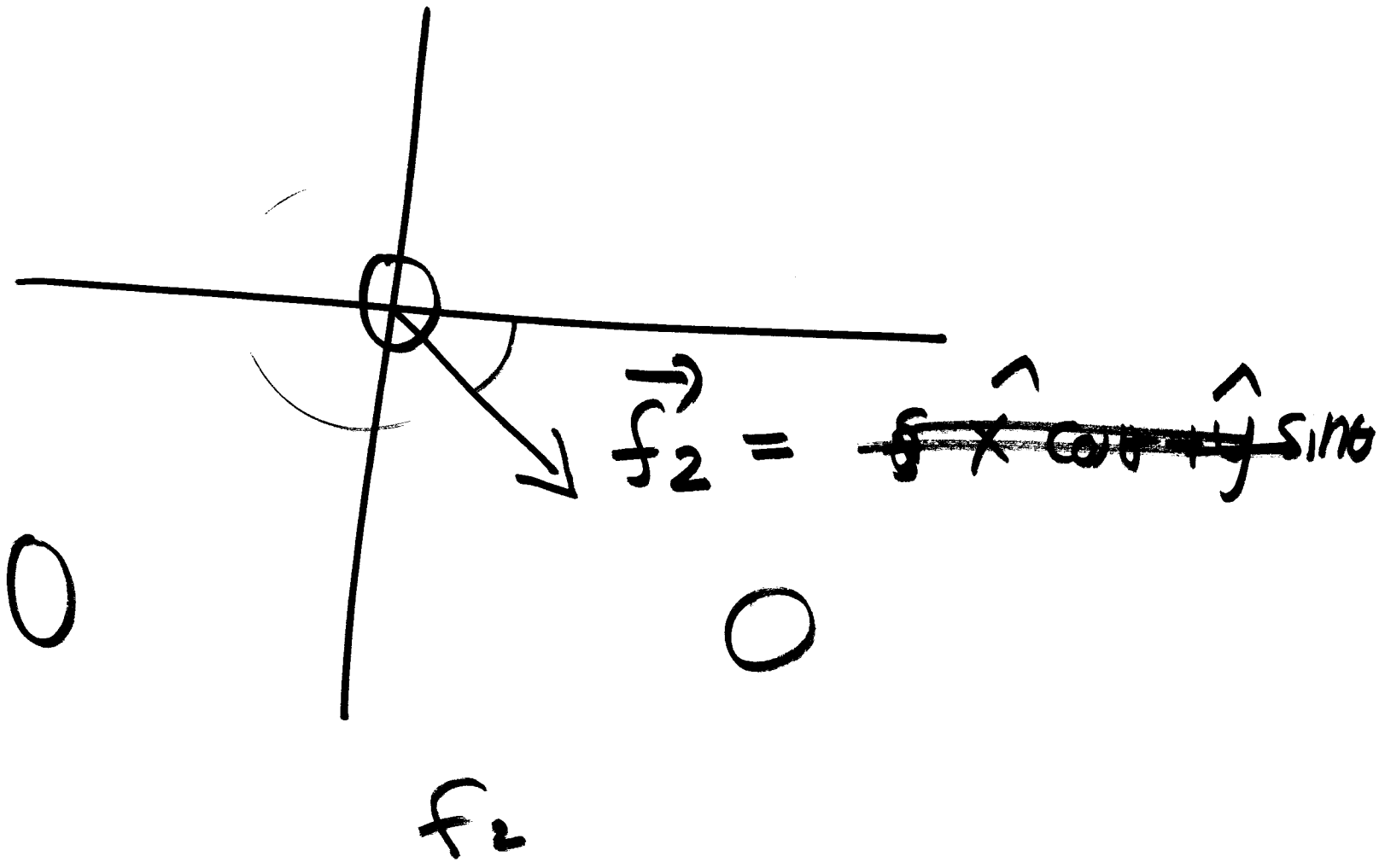


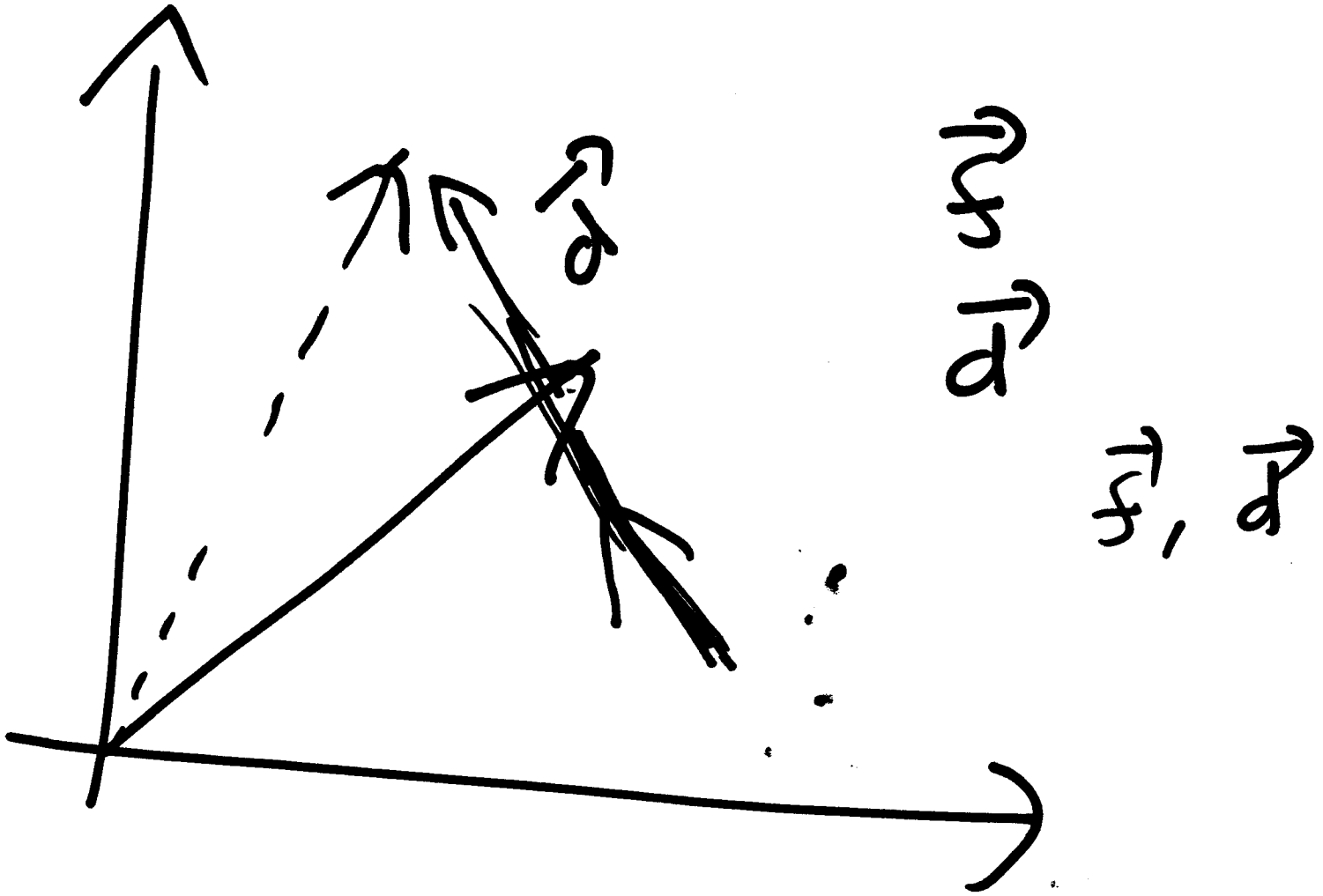
$x = r\cos\theta$

$y = r\sin\theta$

$$r^2 = x^2 + y^2$$

$$x^2 + y^2 = r^2\cos^2\theta + r^2\sin^2\theta = r^2$$


$\vec{f_2} = f\cos\theta\,\hat{x} + f\sin\theta\,\hat{y}$
O
O
f_2


$\vec{F}$
$\vec{F}$
$\vec{v}$
$\vec{F}, \vec{v}$

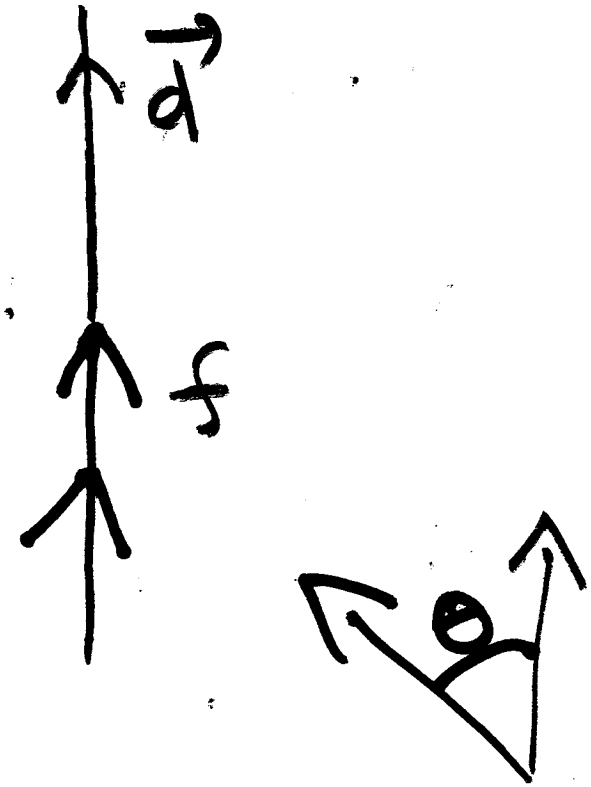
$$\vec{F} \cdot \vec{d} = |\vec{F}|\,|\vec{d}|\,\underbrace{\cos\theta}_{1}$$

$$E = F\,d$$

$\vec{F}$

$\vec{d}$

$\theta = 0$



$$\vec{f} = a_1\hat{x} + a_2\hat{y} + a_3\hat{z}$$

$$|f| = \sqrt{a_1^2 + a_2^2 + a_3^2}$$

$$\vec{d} = d_1\hat{x} + d_2\hat{y} + d_2\hat{z}$$

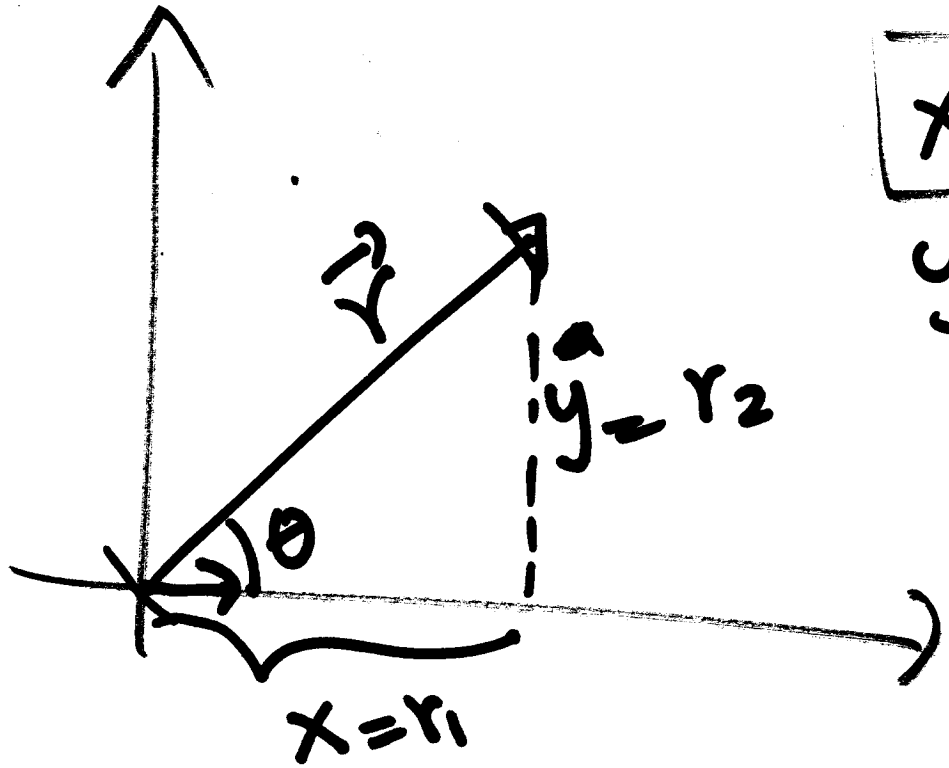
$$\vec{f}\cdot\vec{d}: \quad |f|\,|d| = \sqrt{a_1^2+a_2^2+a_3^2}\cdot \sqrt{d_1^2+d_2^2+d_3^2}$$

$$\vec{f} = f_1 \hat{x} + f_2 \hat{y} + f_3 \hat{z}$$

$$\vec{f} \cdot \vec{f} = |f|\,|f|$$

$$= \sqrt{f_1^2 + f_2^2 + f_3^2} \cdot \sqrt{f_1^2 + f_2^2 + f_3^2}$$

$$\boxed{\vec{f} \cdot \vec{f} = f_1^2 + f_2^2 + f_3^2} = (|f|)^2$$



$$x = |\vec{r}| \cos\theta$$

$$y = |\vec{r}| \sin\theta$$

$$\vec{r} = x\hat{x} + y\hat{y}$$

$$= r_1\hat{x} + r_2\hat{y}$$

$\hat{x}$

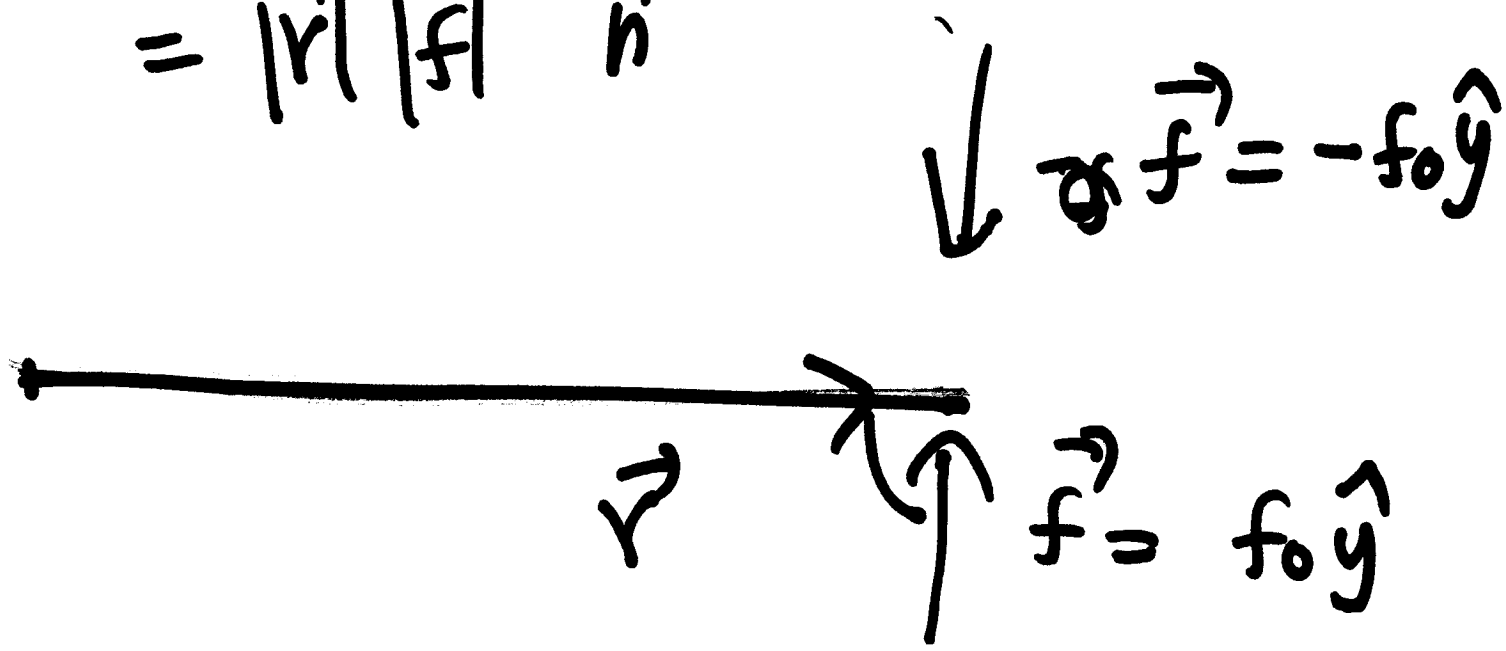
$$\vec{r} \cdot \hat{x} = |\vec{r}|\,|\hat{x}| \cos\theta = |\vec{r}| \cos\theta$$

$$\vec{r} \cdot \hat{y} = |r| \sin\theta$$

$$\vec{\tau} = \vec{r} \times \vec{f}$$

$$= |\vec{r}|\,|\vec{f}| \sin\theta\, \hat{n}$$

$$= |\vec{r}|\,|\vec{f}|\, \hat{n}$$



final