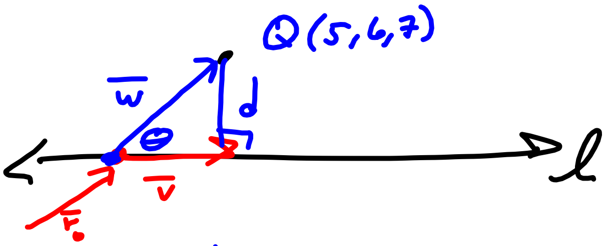
Book gives recipes for distance. Meh



Line to point: sine

$\ell: \quad \bar{r} = \bar{r}_0 + t\bar{v} = \langle 1,2,3\rangle + t\langle -5,2,1\rangle$

$A(1,2,3) \longleftrightarrow \bar{r}_0 = \langle 1,2,3\rangle$

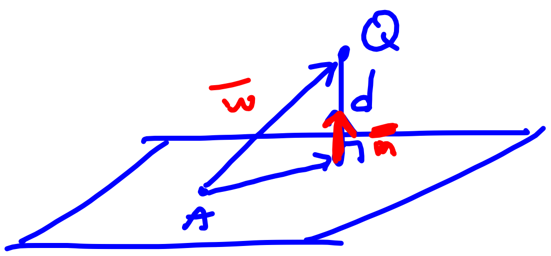
$t=0$

$$\frac{d}{\|\bar{w}\|} = \sin\theta = \frac{\|\bar{w}\times\bar{v}\|}{\|\bar{w}\|\|\bar{v}\|} \Rightarrow d = \|\bar{w}\|\sin\theta = \frac{\|\bar{w}\times\bar{v}\|}{\|\bar{v}\|}$$

$\bar{w}\times\bar{v} = \|\bar{w}\|\|\bar{v}\|\sin\theta$

Never wanted $\text{comp}_d\bar{w}$

d ain't a vector

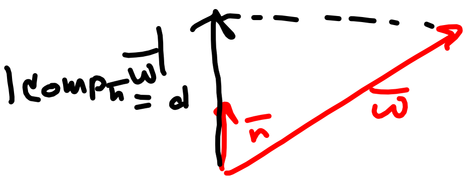


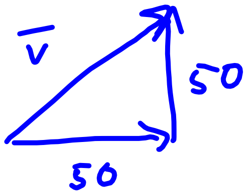
$\text{comp}_{\bar{n}}\bar{w}$ is what we want, because $\bar{n}$ is given.

Plane to a point cosine.

This is a cosine sitch

$\|\bar{a}\|\|\bar{b}\|\cos\theta = \bar{a}\cdot\bar{b}$





$\bar{v} = \langle 50, 50 \rangle$ = velocity

SPEED = $v = \|\bar{v}\| = \sqrt{50^2 + 50^2} = 50\sqrt{2}$

$= \sqrt{2(50)^2} = \sqrt{2}\sqrt{50^2} = 50\sqrt{2}$

$\bar{r}_0 = \langle 20, 10 \rangle$

$\bar{r}(t) = \bar{r}_0 + t\,\bar{v}(0) + \frac{1}{2} t^2 a_0$

Initial Velocity

Acceleration of gravity

$h = \frac{1}{2} g t^2 + v_0 t + h_0$ ← Initial height

v_0 = initial velocity

$g = -9.8 \frac{m}{s^2}$ in 1-D

$g = \langle 0, -9.8 \rangle$

$$\bar{v}(t) = \int g\,dt + \bar{c}$$

$$= \int \langle 0, -9.8 \rangle\,dt + \bar{c}$$

$$= \langle 0, -9.8t \rangle + \bar{c}$$

$$\bar{V}(0) = \langle 50, 50 \rangle = \langle 0, -9.8(0) \rangle + \bar{c}$$

$$\Rightarrow \langle 50, 50 \rangle = \bar{c}$$

$$\rightarrow \bar{v}(t) = \langle 0, -9.8t \rangle + \langle 50, 50 \rangle$$

$$= \langle 50, 50 - 9.8t \rangle$$

$$\bar{r}(t) = \int \bar{v}(t)\,dt + \bar{D}$$

$$= \langle 50t, 50t - \tfrac{1}{2}9.8t^2 \rangle + \bar{D}$$

$$\bar{r}(0) = \bar{r}_0 = \langle 20, 10 \rangle$$

$$= \langle 0, 0 \rangle + \bar{D} = \langle 20, 10 \rangle$$

$$\Rightarrow \bar{D} = \langle 20, 10 \rangle$$

$$\bar{r}(t) = \langle 50t + 20, 50t - 4.9t^2 + 10 \rangle$$

κ = Kappa = curvature = $\frac{d\bar{T}}{ds}$

Assume $t = t(s)$ is function of s

$$\frac{d\bar{T}}{dt} = \boxed{\frac{d\bar{T}}{ds}} \cdot \frac{ds}{dt}$$

Acceleration-related.

$\bar{r}'$

$$\frac{d}{dx}\left[(\sin(x))^3\right] = \frac{d}{d\sin(x)}\left((\sin(x))^3\right) \cdot \frac{d\sin(x)}{dx}$$

$$= (3\sin(x))^2(\cos(x))$$

$y = 0, \pm 1, \pm 2$

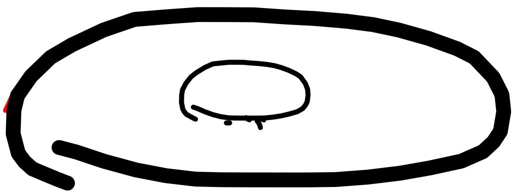
xz-, yz-, xy- planes

$x = 0, \pm 1, \pm 2$

$y = x^2 + 1$

$y = x^2 + 2$

$\frac{x^2}{9} + \frac{y^2}{16} =$



$\frac{x^2}{9} + \frac{y^2}{16} = 100$