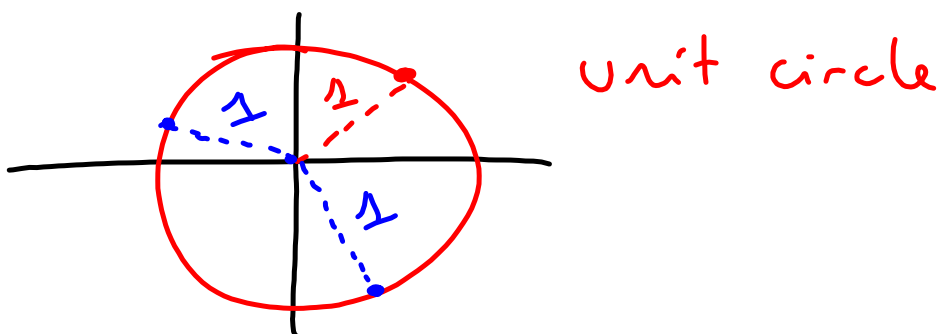


$$\begin{aligned}\vec{r} &= \vec{r}_{\text{obs}} - \vec{r}_{\text{source}} \\ &= \langle x_o, y_o, z_o \rangle - \langle x_s, y_s, z_s \rangle \\ &= \langle x_o - x_s, y_o - y_s, z_o - z_s \rangle\end{aligned}$$

$$\hat{r} = \frac{\vec{r}}{|\vec{r}|}$$

$$|\vec{r}| = \sqrt{(x_o - x_s)^2 + (y_o - y_s)^2 + (z_o - z_s)^2}$$

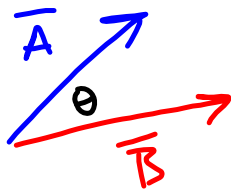
By definition, magnitude of  $\hat{r} = 1$ .



Dot Product:

$$\vec{A} \cdot \vec{B} = |\vec{A}| |\vec{B}| \cos \theta$$

SCALAR!



Cross Product:

$$\vec{A} \times \vec{B} = \langle A_y B_z - A_z B_y, \\ A_z B_x - A_x B_z, \\ A_x B_y - A_y B_x \rangle$$

VECTOR!

SCALAR PART of Cross Product is

$$|\vec{A}| \times |\vec{B}| \sin \theta = |\vec{A}| |\vec{B}| \sin \theta$$

## Quiz:

- Biot - Savart  $\rightarrow$  use, not derive
- charge
- current  $\rightarrow$  wire, loop  
(p.685) (p.687)

HW: P16, P21, P29,  
P34, P46,