1. $\vec{r} = \langle -2, 4 \rangle$ m

a) distance $= |\vec{r}| = \sqrt{(-2)^2 + (4)^2} = 4.47$ m

b) $\hat{r} = \frac{\vec{r}}{|\vec{r}|} = \frac{\langle -2, 4 \rangle \text{ m}}{4.47 \text{ m}} = \langle -0.45, 0.89 \rangle$

$\hat{r} = \langle -.45, \ 89 \rangle$

2. $\vec{r}_{H1} = \langle 2, 4, -1 \rangle$ m

$\vec{r}_0 = \langle 0, -1, 3 \rangle$ m

$\vec{A}$ relative to $\vec{B} \longrightarrow \vec{A} - \vec{B}$

$\vec{r}_{rel} = \vec{r}_{H1} - \vec{r}_0$

$= \langle 2, 4, -1 \rangle \text{m} - \langle 0, -1, 3 \rangle$ m

$\vec{r}_{rel} = \langle 2, 5, -4 \rangle$ m

3. $\vec{r}_n = \langle -1, 0, 3 \rangle$ cm

$\vec{r}_{p-n} = \langle 2, -4, 0 \rangle$ cm

$\vec{r}_{p-n}$ = relative to $\vec{r}_n$

$\vec{r}_p$ = relative to origin

$$\vec{r}_{p-n} = \vec{r}_p - \vec{r}_n$$

$$\vec{r}_p = \vec{r}_{p-n} + \vec{r}_n$$

$$= \langle 2, -4, 0 \rangle \text{ cm} + \langle -1, 0, 3 \rangle \text{ cm}$$

$$\vec{r}_p = \langle 1, -4, 3 \rangle \text{ cm}$$

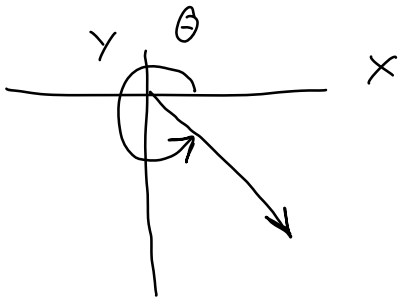
4. $\vec{v} = \langle 3\times10^7, -4\times10^7, 0 \rangle \frac{m}{s}$

a) $|\vec{v}| = \sqrt{(3\times10^7)^2 + (-4\times10^7)^2} = 5\times10^7 \frac{m}{s}$

b) $\hat{v} = \frac{\vec{v}}{|\vec{v}|} = \frac{\langle 3\times10^7, -4\times10^7, 0 \rangle}{5\times10^7}$

$\hat{v} = \langle 0.6, -0.8, 0 \rangle$

c)




$\hat{v} = \langle \cos\theta_x, \cos\theta_y, \cos\theta_z \rangle$

$\cos\theta_x = 0.6 \longrightarrow \theta_x = \pm 53.13^\circ$

$\theta_x = -53.13^\circ$

$= 306.86^\circ$