

### Problem 3.23

The polar notation presentation of our two vectors is:

$$\vec{A} = 3\hat{i} - 2\hat{j}$$

$$\vec{B} = -\hat{i} - 4\hat{j}$$

It is easy to add and subtract vectors presented in unit vector notation, not so easy to do it in polar. In unit vector notation, we can write:

a.)  $\vec{A} + \vec{B}$

$$\begin{array}{r} \vec{A} = 3\hat{i} - 2\hat{j} \\ +\vec{B} = -\hat{i} - 4\hat{j} \\ \hline \vec{A} + \vec{B} = 2\hat{i} - 6\hat{j} \end{array}$$

b.)  $\vec{A} - \vec{B}$

$$\begin{array}{r} \vec{A} = 3\hat{i} - 2\hat{j} \\ -\vec{B} = -(-\hat{i} - 4\hat{j}) \end{array} \Rightarrow \begin{array}{r} \vec{A} = 3\hat{i} - 2\hat{j} \\ -\vec{B} = \hat{i} + 4\hat{j} \\ \hline \vec{A} - \vec{B} = 4\hat{i} + 2\hat{j} \end{array}$$

1.)

c.)  $|\vec{A} + \vec{B}|$

$$\vec{A} + \vec{B} = 2\hat{i} - 6\hat{j} \Rightarrow |\vec{A} + \vec{B}| = \sqrt{2^2 + (-6)^2} = 6.32$$

d.)  $|\vec{A} - \vec{B}|$

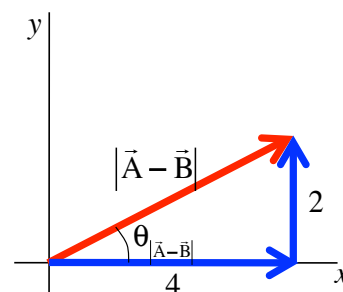
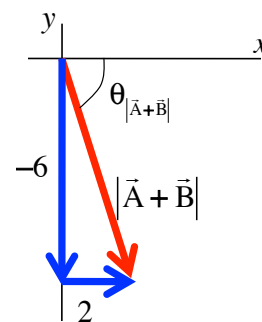
$$\vec{A} - \vec{B} = 4\hat{i} + 2\hat{j} \Rightarrow |\vec{A} - \vec{B}| = \sqrt{4^2 + 2^2} = 4.47$$

e.) Angles?

$$\begin{aligned} \theta_{|\vec{A} + \vec{B}|} &= \tan\left(\frac{-6}{2}\right) \\ &= -71.6^\circ \quad (= 288^\circ) \end{aligned}$$

$$\begin{aligned} \theta_{|\vec{A} - \vec{B}|} &= \tan\left(\frac{2}{4}\right) \\ &= 26.6^\circ \end{aligned}$$

REFERENCE GRAPHS



2.)