Physics 2211K Quiz # 2 solutions:

Version # 1:

Vector $\vec{A} = 4\hat{i} + 2\hat{j}$ and vector $\vec{B} = 3\hat{i} - 5\hat{j}$. Calculate the following:

a. Vector $\vec{C} = \vec{A} + \vec{B}$ (in the $\hat{i}, \hat{j}$ format) $\vec{C} = \vec{A} + \vec{B} = (4+3)\hat{i} + (2-5)\hat{j} = 7\hat{i} - 3\hat{j}$

b. Vector $\vec{C} = \vec{A} + \vec{B}$ (in the $|\vec{C}|$, θ format)

$|\vec{C}| = \sqrt{7^2 + (-3)^2} = 7.55$

$\theta = \arctan\left(\dfrac{-3}{7}\right) = $ -23.2° (from +x in 4th quadrant where x > 0 & y < 0)

Version # 2:

Vector $\vec{A} = 3\hat{i} - 7\hat{j}$ and vector $\vec{B} = -5\hat{i} + 3\hat{j}$. Calculate the following:

a. Vector $\vec{C} = \vec{A} + \vec{B}$ (in the $\hat{i}, \hat{j}$ format) $\vec{C} = \vec{A} + \vec{B} = (3-5)\hat{i} + (-7+3)\hat{j} = -4\hat{i} - 2\hat{j}$

b. Vector $\vec{C} = \vec{A} + \vec{B}$ (in the $|\vec{C}|$, θ format)

$|\vec{C}| = \sqrt{(-4)^2 + (-2)^2} = 4.47$

$\theta = \arctan\left(\dfrac{-2}{-4}\right) = $ 26.6° (from -x in 3rd quadrant where x < 0 & y < 0)

Version #3:

Vector $\vec{A} = 4\hat{i} + 7\hat{j}$ and vector $\vec{B} = -5\hat{i} + 3\hat{j}$. Calculate the following:

a. Vector $\vec{C} = \vec{A} + \vec{B}$ (in the $\hat{i}, \hat{j}$ format) $\vec{C} = \vec{A} + \vec{B} = (4-5)\hat{i} + (7+3)\hat{j} = -\hat{i} + 10\hat{j}$

b. Vector $\vec{C} = \vec{A} + \vec{B}$ (in the $|\vec{C}|$, θ format)

$|\vec{C}| = \sqrt{(-1)^2 + 10^2} = 10.1$

$\theta = \arctan\left(\dfrac{10}{-1}\right) = $ -84.3° (from -x in 2rd quadrant where x < 0 & y > 0)

NOTE: In describing the direction of a vector, it is necessary to give (or show) the reference direction and to pay attention to the signs of the x- and y-components.