National University

of Computer & Emerging Sciences

Applied Physics (NS-1001) **Quiz # 1A** **Fall 2025**

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Name: **Roll #:**

Section: BCS-B **CLO1** **Date: 03-09-2025**

Q.1: Vector A has a negative x component of 3.00 units in length and a positive y component 2.00units in length. (a) Determine an expression for A in unit-vector notation. (b) Determine the magnitude and direction of A (c) What vector B when added to A gives a resultant vector with no x component and a negative y component 4.00 units in length? (7M)

Solution:

The component description of $\vec{\mathbf{A}}$ is just restated to constitute the answer to part (a): $A_x = -3.00$, $A_y = 2.00$.

(a) $\vec{\mathbf{A}} = A_x\hat{\mathbf{i}} + A_y\hat{\mathbf{j}} = \boxed{-3.00\hat{\mathbf{i}} + 2.00\hat{\mathbf{j}}}$

(b) $\left|\vec{\mathbf{A}}\right| = \sqrt{A_x^2 + A_y^2} = \sqrt{(-3.00)^2 + (2.00)^2} = \boxed{3.61}$

$$\theta = \tan^{-1}\left(\frac{A_y}{A_x}\right) = \tan^{-1}\left(\frac{2.00}{-3.00}\right) = -33.7°$$

θ is in the second quadrant, so $\theta = 180° + (-33.7°) = \boxed{146°}$.

(c) $R_x = 0$, $R_y = -4.00$, and $\vec{\mathbf{R}} = \vec{\mathbf{A}} + \vec{\mathbf{B}}$, thus $\vec{\mathbf{B}} = \vec{\mathbf{R}} - \vec{\mathbf{A}}$ and

$B_x = R_x - A_x = 0 - (-3.00) = 3.00$, $B_y = R_y - A_y = -4.00 - 2.00 = -6.00$.

Therefore, $\vec{\mathbf{B}} = \boxed{3.00\hat{\mathbf{i}} - 6.00\hat{\mathbf{j}}}$.