# National University

of Computer & Emerging Sciences

## Quiz # 1B
## Instructor: Muhammad Kashif Ali

**Name:**_____ **Roll No:**_____
**Section:**_____ **Date:**_____

**Q.NO.1:** For the three vectors shown in the Fig.1, $\vec{A} + \vec{B} + \vec{C} = 1\hat{j}$
What is vector B?

a. Write $\vec{B}$ in component form.

b. Write $\vec{B}$ as a magnitude and a direction.

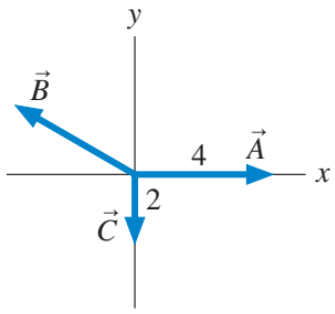
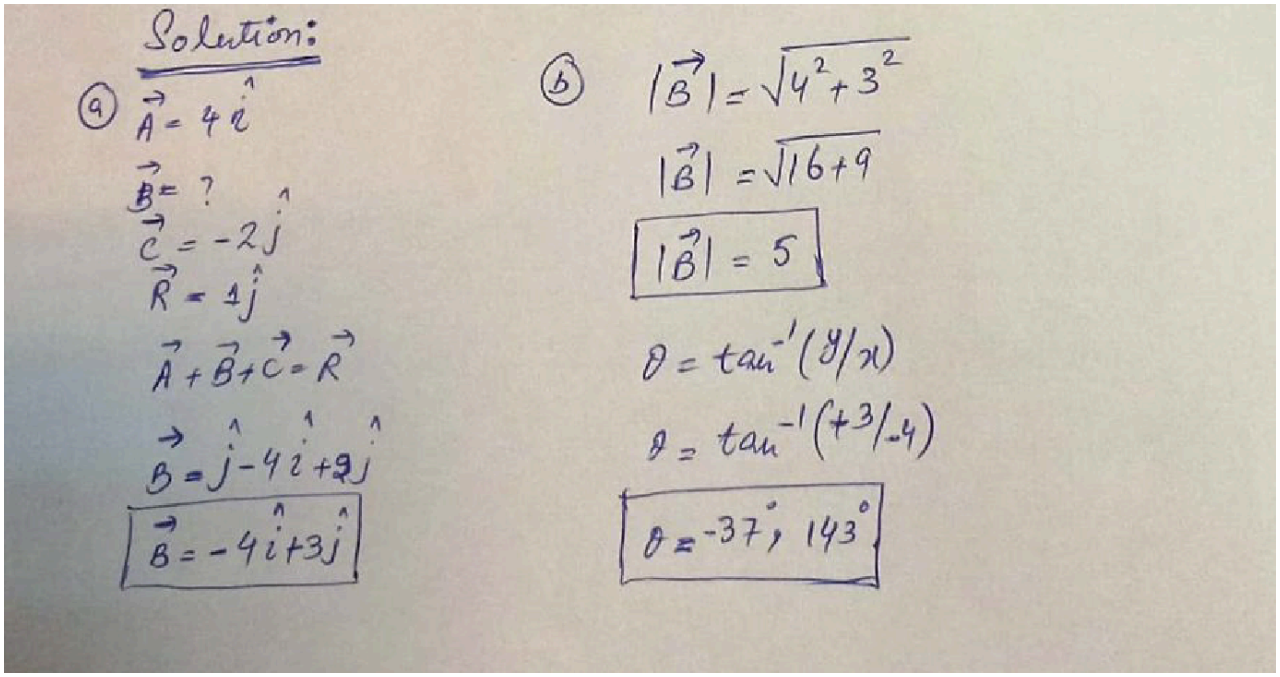



Fig. 1

**Sol:**



**Q.1.** For given vectors, calculate the divergence.

$$\mathbf{v}_a = \mathbf{r} = x\,\hat{\mathbf{x}} + y\,\hat{\mathbf{y}} + z\,\hat{\mathbf{z}},\ \mathbf{v}_b = \hat{\mathbf{z}},\ \text{and}\ \mathbf{v}_c = z\,\hat{\mathbf{z}}.$$

**Solution:**

$$\nabla \cdot \mathbf{v}_a = \frac{\partial}{\partial x}(x) + \frac{\partial}{\partial y}(y) + \frac{\partial}{\partial z}(z) = 1 + 1 + 1 = 3.$$

As anticipated, this function has a positive divergence.

$$\nabla \cdot \mathbf{v}_b = \frac{\partial}{\partial x}(0) + \frac{\partial}{\partial y}(0) + \frac{\partial}{\partial z}(1) = 0 + 0 + 0 = 0,$$

as expected.

$$\nabla \cdot \mathbf{v}_c = \frac{\partial}{\partial x}(0) + \frac{\partial}{\partial y}(0) + \frac{\partial}{\partial z}(z) = 0 + 0 + 1 = 1.$$