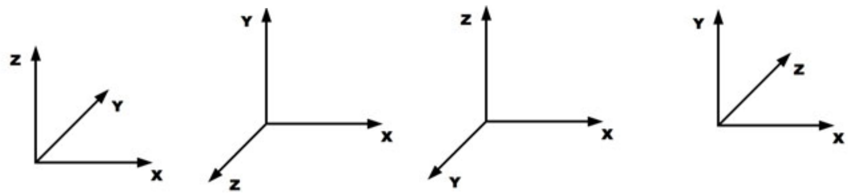
Question 1:

System 1 **System 2** **System 3** **System 4**



Which of the following systems are right handed:

I) System 1 and System 2
II) System 3 and System 4
III) System 1 and System 3
IV) System 2 and System 4

Choose the correct answer:
Correct answer is I

Question 2:
Let $\vec{A}_1 + 2.0\vec{A}_2 = 5.0\vec{A}_3$ and $\vec{A}_1 - \vec{A}_2 = \vec{A}_3$ and $\vec{A}_3 = 2.0\hat{\imath} + 3.0\hat{\jmath} - 5\hat{k}$. $\vec{A}_2$ is equal to:

I) $\frac{14}{3}\hat{\imath} + 7\hat{\jmath} - \frac{35}{3}\hat{k}$, II) $\frac{8}{3}\hat{\imath} + 4.0\hat{\jmath} - \frac{20}{3}\hat{k}$, III) $\frac{3}{8}\hat{\imath} + 4.0\hat{\jmath} - \frac{3}{20}\hat{k}$, IV) $\frac{14}{3}\hat{\imath} + 7\hat{\jmath} - \frac{35}{3}\hat{k}$
Choose the correct answer:
Correct answer is II

- Let $\vec{A}_1 + 2.0\vec{A}_2 = 5.0\vec{A}_3$ and $\vec{A}_1 - \vec{A}_2 = \vec{A}_3$ and $\vec{A}_3 = 2.0\hat{\imath} + 3.0\hat{\jmath} - 5\hat{k}$. Find $\vec{A}_1 and\ \vec{A}_2$

1. Note $\vec{A}_1 = A_{1x}\hat{\imath} + A_{1y}\hat{\jmath} + A_{1z}\hat{k}$ and $\vec{A}_2 = A_{2x}\hat{\imath} + A_{2y}\hat{\jmath} + A_{2z}\hat{k}$
2. Label $\vec{A}_1 + 2.0\vec{A}_2 = 5.0\vec{A}_3$ **E1**, $\vec{A}_1 - \vec{A}_2 = \vec{A}_3$ **E2**

<u>Execution of Solution</u>:
Abbreviation: LHS stands for Left hand side; RHS stands for Right hand side

- **E1** + 2 x **E2**→ $\left(\vec{A}_1 + 2.0\vec{A}_2\right) + 2\left(\vec{A}_1 - \vec{A}_2\right) = 5.0\vec{A}_3 \quad + \quad 2 \times \vec{A}_3$
- LHS of E1 2 X LHS of E2 RHS of E1 2 X LHS of E2
- $3\vec{A}_1 = 7.0\vec{A}_3$
- But we know $\vec{A}_3 = 2.0\hat{\imath} + 3.0\hat{\jmath} - 5\hat{k}$
- $3\vec{A}_1 = 7.0\vec{A}_3 \to 3\left(A_{1x}\hat{\imath} + A_{1y}\hat{\jmath} + A_{1z}\hat{k}\right) = 7\left(2.0\hat{\imath} + 3.0\hat{\jmath} - 5\hat{k}\right)$
- $3A_{1x}\hat{\imath} + 3A_{1y}\hat{\jmath} + 3A_{1z}\hat{k} = 14.0\hat{\imath} + 21.0\hat{\jmath} - 35\hat{k}$
- $3A_{1x} = 14 \to A_{1x} = \frac{3}{14}; A_{1y} = 7.0\hat{\jmath}; A_{1z} = -\frac{35}{3} \to \vec{A}_1 = \frac{3}{14}\hat{\imath} + 7\hat{\jmath} - \frac{35}{3}\hat{k}$

- Use **E2**, $\vec{A}_2 = \vec{A}_1 - \vec{A}_3 \rightarrow$
- $A_{2x}\hat{\imath} + A_{2y}\hat{\jmath} + A_{2z} = \frac{14}{3}\hat{\imath} + 7\hat{\jmath} - \frac{35}{3}\hat{k} - \left(2.0\hat{\imath} + 3.0\hat{\jmath} - 5\hat{k}\right)$
- $\vec{A}_2 = \frac{8}{3}\hat{\imath} + 4.0\hat{\jmath} - \frac{20}{3}\hat{k}$
- Verify **E1**,
- $\vec{A}_1 + 2.0\vec{A}_2 = \frac{14}{3}\hat{\imath} + 7\hat{\jmath} - \frac{35}{3}\hat{k} + 2 \times \left(\frac{8}{3}\hat{\imath} + 4.0\hat{\jmath} - \frac{20}{3}\hat{k}\right) = 10.0\hat{\imath} + 15.0\hat{\jmath} - 25\hat{k} = 5.0\vec{A}_3$