

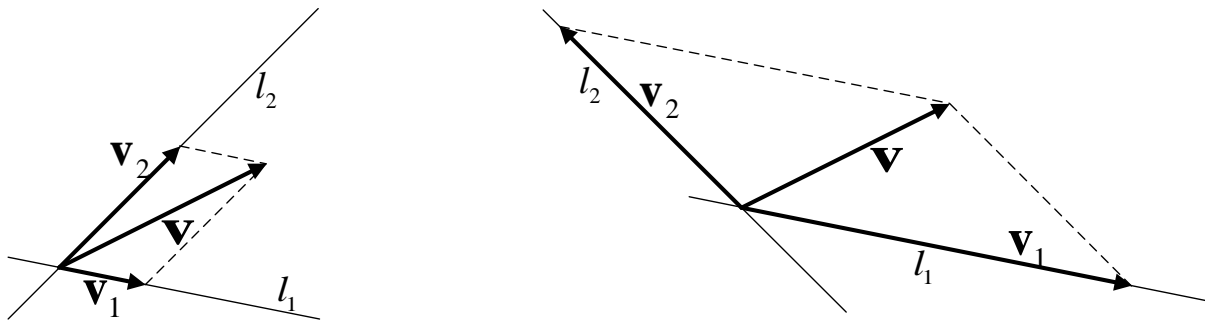
**Forkunnskaper i matematikk for fysikkstudenter.**  
**Integrasjon-test løsning.**

---

**Oppgave 1:**

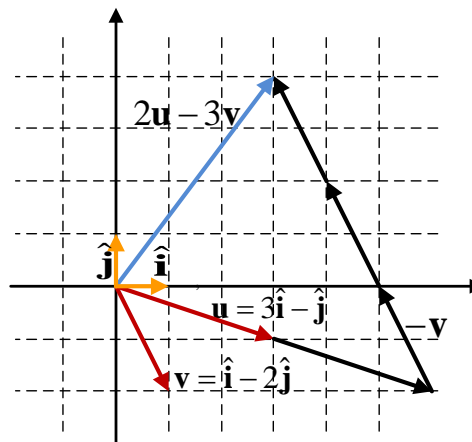


**Oppgave 2:** Figurene nedenfor viser hvordan vektoren  $\mathbf{v}$  kan dekomponeres i to komponenter  $\mathbf{v}_1$  og  $\mathbf{v}_2$  langs linjene  $l_1$  og  $l_2$ :



**Oppgave 3:**

$$\begin{aligned} \mathbf{u} &= 3\hat{\mathbf{i}} - \hat{\mathbf{j}}, & \mathbf{v} &= \hat{\mathbf{i}} - 2\hat{\mathbf{j}} \\ 2\mathbf{u} - 3\mathbf{v} &= 2(3\hat{\mathbf{i}} - \hat{\mathbf{j}}) - 3(\hat{\mathbf{i}} - 2\hat{\mathbf{j}}) \\ &= 6\hat{\mathbf{i}} - 2\hat{\mathbf{j}} - 3\hat{\mathbf{i}} + 6\hat{\mathbf{j}} = \underline{\underline{3\hat{\mathbf{i}} + 4\hat{\mathbf{j}}}} \end{aligned}$$



**Oppgave 4:**

$$|\mathbf{u}| = \sqrt{3^2 + (-1)^2} = \sqrt{9+1} = \underline{\underline{\sqrt{10}}}.$$

$$|\mathbf{v}| = \sqrt{1^2 + (-2)^2} = \sqrt{1+4} = \underline{\underline{\sqrt{5}}}.$$

$$\mathbf{u} \cdot \mathbf{v} = (3\hat{\mathbf{i}} - \hat{\mathbf{j}}) \cdot (\hat{\mathbf{i}} - 2\hat{\mathbf{j}}) = 3 \cdot 1 + (-1) \cdot (-2) = \underline{\underline{5}}.$$

$$\mathbf{u} \cdot \mathbf{v} = |\mathbf{u}| \cdot |\mathbf{v}| \cdot \cos \theta \Leftrightarrow \cos \theta = \frac{\mathbf{u} \cdot \mathbf{v}}{|\mathbf{u}| \cdot |\mathbf{v}|} = \frac{5}{\sqrt{10} \cdot \sqrt{5}} = \frac{\cancel{5}}{\sqrt{2} \cdot \cancel{\sqrt{5}} \cdot \sqrt{5}} = \frac{1}{\sqrt{2}} \Leftrightarrow \theta = \underline{\underline{45^\circ}}.$$