

Let vector  $\mathbf{F} = -\mathbf{i} + 3\mathbf{j} + \mathbf{k}$ ,  $\mathbf{G} = 2\mathbf{j} - 4\mathbf{k}$ . Find the angle between the vectors  $\mathbf{F}$  and  $\mathbf{G}$ . [102勤益電子6]

$$[\text{解}] \mathbf{F} \cdot \mathbf{G} = |\mathbf{F}| |\mathbf{G}| \cos \theta$$

$$\cos \theta = \frac{\mathbf{F} \cdot \mathbf{G}}{|\mathbf{F}| |\mathbf{G}|} = \frac{(-\mathbf{i} + 3\mathbf{j} + \mathbf{k}) \cdot (2\mathbf{j} - 4\mathbf{k})}{\sqrt{(-1)^2 + 3^2 + 1^2} \sqrt{2^2 + (-4)^2}} = \frac{0 + 6 - 4}{\sqrt{11} \cdot 2\sqrt{5}} = \frac{1}{\sqrt{55}}$$

$$\theta = \cos^{-1}\left(\frac{1}{\sqrt{55}}\right)$$