



1 Gjør oppgave 11-16, samt 28 og 29 på side 18-21.

2 (a) La $\mathbf{u} = (1, 2, 1)$ og $\mathbf{v} = (0, 1, 4)$ i \mathbb{R}^3 . Definer $\mathbf{w} = \mathbf{v} - \frac{\mathbf{u} \cdot \mathbf{v}}{\|\mathbf{u}\|^2} \mathbf{u}$ i \mathbb{R}^3 . Beregn \mathbf{w} og finn $\mathbf{w} \cdot \mathbf{u}$. Hvordan kan vi tolke vektoren $\frac{\mathbf{u} \cdot \mathbf{v}}{\|\mathbf{u}\|^2} \mathbf{u}$ og lengden til \mathbf{w} ?

(b) La $\mathbf{x} = (0, 1, 1)$ i \mathbb{R}^3 . Beregn $\mathbf{y} = \mathbf{x} - \frac{\mathbf{u} \cdot \mathbf{x}}{\|\mathbf{u}\|^2} \mathbf{u} - \frac{\mathbf{w} \cdot \mathbf{x}}{\|\mathbf{w}\|^2} \mathbf{w}$ og finn $\mathbf{y} \cdot \mathbf{u}$ og $\mathbf{y} \cdot \mathbf{w}$.

(c) La $\{\mathbf{u}_1, \mathbf{u}_1, \dots, \mathbf{u}_t, \mathbf{u}'_{t+1}\}$ være vektorer i \mathbb{R}^n , der $\mathbf{u}_i \cdot \mathbf{u}_j = 0$ for $i \neq j$ og i og j inneholdt i $\{1, 2, \dots, t\}$. La

$$\mathbf{u}_{t+1} = \mathbf{u}'_{t+1} - \frac{\mathbf{u}_1 \cdot \mathbf{u}'_{t+1}}{\|\mathbf{u}_1\|^2} \mathbf{u}_1 - \frac{\mathbf{u}_2 \cdot \mathbf{u}'_{t+1}}{\|\mathbf{u}_2\|^2} \mathbf{u}_2 - \dots - \frac{\mathbf{u}_t \cdot \mathbf{u}'_{t+1}}{\|\mathbf{u}_t\|^2} \mathbf{u}_t.$$

Vis at $\mathbf{u}_{t+1} \cdot \mathbf{u}_i = 0$ for $i = 1, 2, \dots, t$.

(d) La $\mathbf{u}_1 = (1, 2)$, $\mathbf{u}'_2 = (3, 2)$ og $\mathbf{u}'_3 = (2, 2)$ i \mathbb{R}^2 . Finn de følgende vektorene:

$$\begin{aligned} \mathbf{u}_2 &= \mathbf{u}'_2 - \frac{\mathbf{u}_1 \cdot \mathbf{u}'_2}{\|\mathbf{u}_1\|^2} \mathbf{u}_1 \\ \mathbf{u}_3 &= \mathbf{u}'_3 - \frac{\mathbf{u}_1 \cdot \mathbf{u}'_3}{\|\mathbf{u}_1\|^2} \mathbf{u}_1 - \frac{\mathbf{u}_2 \cdot \mathbf{u}'_3}{\|\mathbf{u}_2\|^2} \mathbf{u}_2 \end{aligned}$$