

$$z = f(x, y) = \sin(x) - \cos(y)$$

$$\vec{w} = 4 \cdot \vec{i} + 3 \cdot \vec{j} = (4, 3)$$

punt $Q(a, b)$

$$\text{Eenheids-richtingsvector } \vec{n} = \frac{(4, 3)}{\|(4, 3)\|}$$

$$= \frac{(4, 3)}{\sqrt{4^2 + 3^2}} = \frac{(4, 3)}{5} = \left(\frac{4}{5}, \frac{3}{5}\right)$$

$$\frac{\partial f}{\partial x} = \cos(x) \text{ en } \frac{\partial f}{\partial y} = \sin(y)$$

$$\frac{\partial f}{\partial x}(a, b) = \cos(a) \text{ en } \frac{\partial f}{\partial y}(a, b) = \sin(b)$$

$$D_{\vec{n}} f(a, b) = \nabla f(a, b) \cdot \vec{n} = \left(\frac{\partial f}{\partial x}(a, b), \frac{\partial f}{\partial y}(a, b) \right) \cdot \vec{n}$$

$$= \left(\cos(a), \sin(b) \right) \cdot \left(\frac{4}{5}, \frac{3}{5} \right) = \frac{4}{5} \cdot \cos(a) + \frac{3}{5} \cdot \sin(b)$$

$$\frac{4}{5} \cdot \cos(a) + \frac{3}{5} \cdot \sin(b) \text{ is maximaal}$$

$$\Leftrightarrow \cos(a) = 1 \text{ en } \sin(b) = 1$$

De maximale waarde van $\sup_{\mathbb{R}} f(a, b)$ is dan

$$\frac{4}{5} \cdot 1 + \frac{3}{5} \cdot 1 = \frac{7}{5}.$$

$$\text{Dan is } a = k \cdot 2\pi \quad (k \in \mathbb{Z})$$

$$b = \frac{\pi}{2} + l \cdot 2\pi \quad (l \in \mathbb{Z})$$