2.7 nr 2: $f(u,v) = ue^{-v}$, $g(x,y,z) = 2xy+z$, $h(x,y,z) = 2y(z+x)$

$$= 2yz + 2yx$$

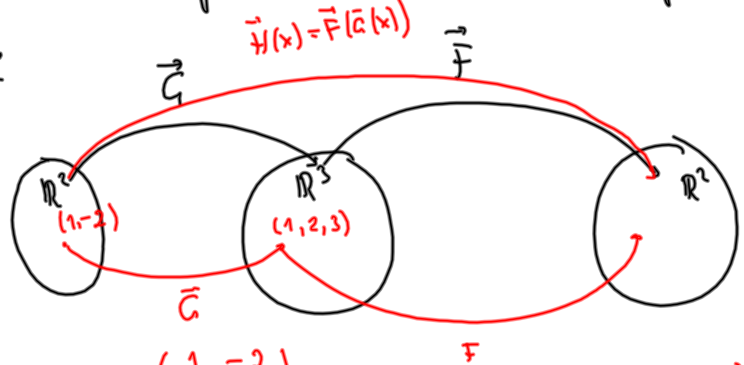
$$k(x,y,z) = f(g(x,y,z), h(x,y,z))$$

$$\frac{\partial k}{\partial x} = \frac{\partial f}{\partial u}\cdot\frac{\partial g}{\partial x} + \frac{\partial f}{\partial v}\frac{\partial h}{\partial x}$$

$$= e^{-v}\,2y + (-ue^{-v})\,2y = 2e^{-(2yz+2yx)}y - (2xy+z)e^{-(2yz+2yx)}2y$$

$$= 2ye^{-(2yz+2yx)}(1 - 2xy - z)$$

2.7, nr 5:



Ved $\vec{G}'(1,-2) = \begin{pmatrix} 1 & -2 \\ 3 & 1 \\ 2 & -1 \end{pmatrix}$, $\vec{F}'(1,2,3) = \begin{pmatrix} 2 & 1 & 4 \\ 0 & 2 & 2 \end{pmatrix}$

Hva er $\vec{H}'(1,-2)$?

Kjerneregelen: $\underset{(1,-2)}{\vec{H}'(\vec{x})} = \vec{F}'(\underbrace{\vec{G}(\vec{x})}_{(1,2,3)})\cdot\vec{G}'(\underset{(1,-2)}{\vec{x}})$

$$\vec{H}'(1,-2) = \underset{2\times 3}{\begin{pmatrix} 2 & 1 & 4 \\ 0 & 2 & 2 \end{pmatrix}} \underset{3\times 2}{\begin{pmatrix} 1 & -2 \\ 3 & 1 \\ 2 & -1 \end{pmatrix}} = \underset{2\times 2}{\begin{pmatrix} 13 & -7 \\ 10 & 0 \end{pmatrix}}$$

2.7.nr 7: $E_1(p_1, p_2)$ Ved tiden t: $p_1(t)$, $p_2(t)$

$$e(t) = E_1(p_1(t), p_2(t))$$

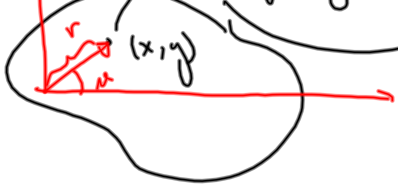
$$e'(t) = \frac{\partial E_1}{\partial p_1} p_1'(t) + \frac{\partial E_1}{\partial p_2} p_2'(t)$$

$$= \frac{\partial E_1}{\partial p_1} \frac{\partial p_1}{\partial t} + \frac{\partial E_1}{\partial p_2} \frac{\partial p_2}{\partial t}.$$

2.7.nr 8:

$$T = f(x,y) = f(r\cos\theta, r\sin\theta)$$

a)



$$\frac{\partial T}{\partial r} = \frac{\partial f}{\partial x} \cdot \frac{\partial}{\partial r}(r\cos\theta) + \frac{\partial f}{\partial y} \frac{\partial}{\partial r}(r\sin\theta) = \frac{\partial f}{\partial x}\cos\theta + \frac{\partial f}{\partial y}\sin\theta$$

$$\frac{\partial T}{\partial \theta} = \frac{\partial f}{\partial x} \frac{\partial}{\partial \theta}(r\cos\theta) + \frac{\partial f}{\partial y} \frac{\partial}{\partial \theta}(r\sin\theta) = -\frac{\partial f}{\partial x} r\sin\theta + \frac{\partial f}{\partial y} r\cos\theta$$

b)

Temperaturen ved fuglen ved tiden t:

$$T(t) = f(g(t)\cos h(t), g(t)\sin h(t))$$

$$= T(\underset{r}{g(t)}, \underset{\theta}{h(t)})$$

$$T'(t) = \frac{\partial T}{\partial r} g'(t) + \frac{\partial T}{\partial \theta} \cdot h'(t)$$

$$= \left(\frac{\partial f}{\partial x}\cos(h(t)) + \frac{\partial f}{\partial y}\sin(h(t))\right) g'(t)$$

$$+ \left(-\frac{\partial f}{\partial x} g(t)\sin(h(t)) + \frac{\partial f}{\partial y} g(t)\cos(h(t))\right) h'(t)$$