Opgave 9.2.57

Drug Reaction The reaction to x units of a drug t hours after it was administered is given by

$$R(x,t) = x^2(a-x)t^2 e^{-t}$$

For $0 \leq x \leq a$ (Where a is a constant). Find the following

- a. $\frac{\delta R}{\delta x}$
- b. $\frac{\delta R}{\delta t}$
- c. $\frac{\delta R}{\delta x^2}$
- d. $\frac{\delta R}{\delta x \delta t}$

Opskrive funktionen

$$R(x,t) = x^2(a-x)t^2 e^{-t}$$
$$= (ax^2 - x^3)t^2 e^{-t}$$

Find R_x

$$R_x(x,t) = \left((ax^2 - x^3)t^2 e^{-t}\right)_x$$
$$= (ax^2 - x^3)_x \cdot t^2 e^{-t}$$
$$= (2ax - 3x^2) \cdot t^2 e^{-t}$$

Find R_t

$$R_t(x,t) = \left((ax^2 - x^3)t^2 e^{-t}\right)_t$$
$$= (ax^2 - x^3)(t^2 e^{-t})_t$$
$$= (ax^2 - x^3)(2te^{-t} - t^2 e^{-t})$$
$$= (ax^2 - x^3)(2t - t^2)e^{-t}$$

Find R_{xx}

$$R_{xx}(x,t) = \left((2ax - 3x^2) \cdot t^2 e^{-t}\right)_x$$
$$= (2ax - 3x^2)_x \cdot t^2 e^{-t}$$
$$= (2a - 6x) \cdot t^2 e^{-t}$$

Find R_{xt}

$$R_{xt} = \left((2ax - 3x^2) \cdot t^2 e^{-t}\right)_t$$
$$= (2ax - 3x^2) \cdot (t^2 e^{-t})_t$$
$$= (2ax - 3x^2) \cdot (2te^{-t} - t^2 e^{-t})$$
$$= (2ax - 3x^2) \cdot (2t - t^2)e^{-t}$$