brouillon

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e) $J(\theta) = \frac{1}{m} \sum_i \left(h_\theta(x_i) - y_i\right)$ for linear reg.

$$J(f_i) = \sum_{k=0}^{M-1} \Big(\overset{y}{t'_k} - \underbrace{\sum_{i=0}^{N-1} D_{ik} f'_i}_{h(x)\,?} \Big)^2$$

We are looking for $\frac{\partial J(f_i)}{\partial f_i}$

$$\frac{\partial J(f_i)}{\partial f_i} = \frac{\partial}{\partial f_i} \left\{ \sum \Big(t_k - \sum_i D_{ik} f_i \Big)^2 \right\}$$

$$= \sum \frac{\partial}{\partial f_i} \Big(t_k - \sum D_{ik} f_i \Big)^2$$

$$= \sum \Big(t_k - \sum D_{ik} f_i \Big) \cdot D_{ik} \cdot 2$$

f) $$\frac{\partial}{\partial f_i} \left(\sum \Big(t_k - \sum_i D_{ik} f_i \Big)^2 + \sum_i f_i^2 \right)$$

$$= \underbrace{\sum \Big(t_k - \sum D_{ik} f_i \Big) \cdot D_{ik} \cdot 2}_{\text{same as before}} + 2 \sum_i f_i$$