$$y \cdot \frac{1}{g(k^T x)} - (1-y) \cdot \frac{1}{1-g(k^T x)} \cdot \frac{d g(k^T x)}{dk}$$

$$\frac{d}{dk_j} \ell(k) = (y - h(x)) x_j = y \cdot x_j - h(x) \cdot x_j$$

$$= y \cdot x_j - g(k^T x) x_j$$

$$\Rightarrow \frac{d}{dk_j^2} \ell(k) = -\frac{d}{dk_j}\left(g(k^T x) x_j\right)$$

$$(x, y) \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

$$= -x_j^2 \cdot \frac{d}{dk_j} \underbrace{g(k^T x)}_{\frac{1}{1+e^{-k^T x}}}$$

$$= a\bar{x} + yc \quad xb + xd$$

$$axm + ycm + xbm + dxm$$

$$f(g(x))' = f'(g(x)) \cdot g'(x)$$

$$=$$

$$+ \frac{1}{(1+e^{-k^T x})^2} \times e^{-k^T x} \times -x_j$$

$$\frac{d}{dk_i k_j} = \boxed{-g(k^T x)(1-g(k^T x)) \cdot x_j \cdot x_i}$$

$$= g(k^T x)(1-g(k^T x)) \cdot (-x_j)$$

$$H = -\sum_{i=1}^{m} \overbrace{h(x^{(i)})}^{>0} (1 - \underbrace{h(x^{(i)})}_{\leq 1}) \cdot x^{(i)} x^{(i)T}$$

$\Rightarrow$ hes semidefinit

$$= -x_j \, x_i^2 \cdot g(k^T x)(1 - g(k^T x))$$

$$\Rightarrow -\sum_{k=1}^{m} x^{(k)} \cdot x^{(k)T}$$

$$\Rightarrow -\sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{k=1}^{m} x_i^{(k)} x_j^{(k)T} z_i z_j \quad \text{c from hint} \geq 0$$

$$\Rightarrow \leq 0$$

$(x^T z)^2 \geq 0$ bc ^{2}

$x^T z \; x^T z$

$\sum_i x_i z_i \cdot \sum_j x_j z_j$ -> distr.

$$\sum_{k}^{10} \sum_{j}^{10}$$

$(a + b)(x + z)$

$= ax + az + bx + bz$