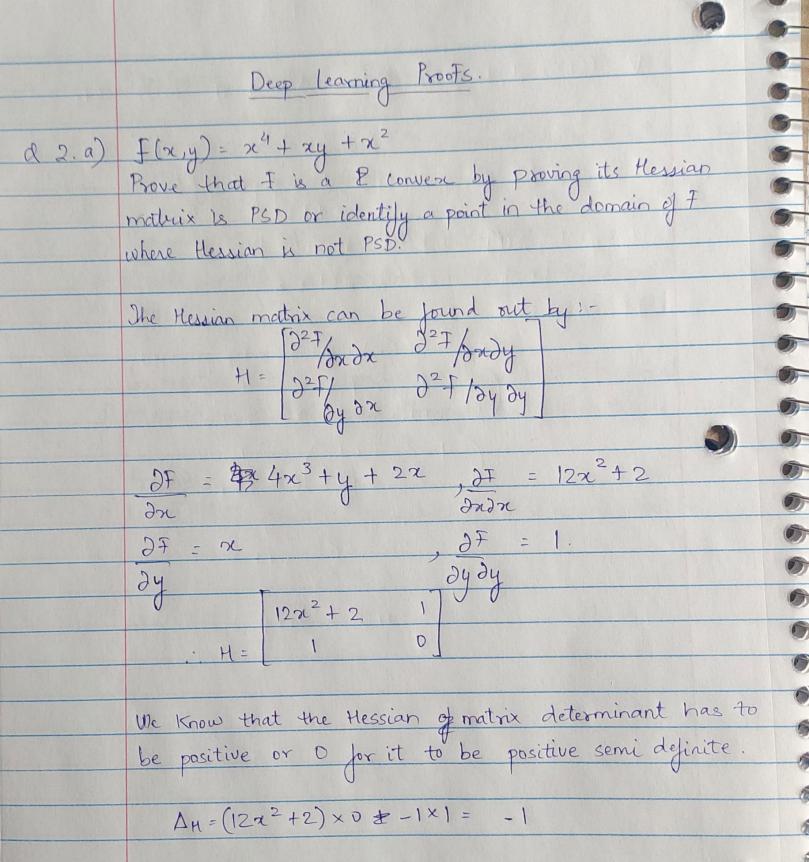
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Since the determinant of the matrix is -1, this means I that those exists a point where the Hessian is negative. Thus I is not a convex Function.

Show that, for any real vector v, it is always true that $V^THV \ge 0$. 26) fms=(w)=1 (x7w-y)(x7w-y)
2n (x) 10 9/21= (1 ((x) w) y) = 1 11111 200 - 44 10012 44 $\frac{\partial F_{\text{mSE}}(w)}{\partial w^2} = 1 \times (X) \times (X^7) = \text{Hessian matrix.} = H$ Jo prove that v7HV>0, VTHV = CONTRACT = x (1/n) x (v7) x (x) x (x7) x v $\times.\times^7$ is a positive semi definite matrix which means that $(v^7)*(x)*(x^7)*(v)$ will also be >0. means the func Finse (w) is convex wit weight vector w.

4a) 1+e-x Prove that $\sigma(-\alpha) = 1 - \sigma(\alpha)$ $\forall \alpha$. $LHS = \sigma(-x) = 1$ $1+e^{x}$ · RHS=1- \(\sigma\)=1- 1 (0-16+e-2) 10 = 5119 $= 1 + e^{-2} - 1 - 1$ $1 + e^{-2} + 1$ $= e^{-\pi}$ $1 + e^{-\pi}$ (3.3 + 1)Multiplying by ex, we get $= \frac{e^{-2} \times e^{2}}{(1+e^{-2})e^{2}}$: LHS = RHS

4b) Prove that $\sigma'(x) = \partial \sigma(x) = \sigma(x)(1 - \sigma(x))$ Voc Ly (10) D -1 - (1-1) D tolk with $\partial \sigma(n) = 1 \times e^{-n} \times (-1)$ $\partial x = -e^{-n} = LHS.$ (1+e-2)2 RHS = o(x)(1-o(x)) $= (1 + e^{-xi}) \times (1 + e^{-xi})$ $= 1 \left(1 + e^{-\alpha} - 1 \right)$ $(1 + e^{-\alpha}) \left(1 + e^{-\alpha} \right)$ $= e^{-2}$ $(1+e^{-2})^2$: LHS = RHS X 3 () 3 ()