answer

J$(\theta) = -1 \sum_{i=1}^{\left(y^{(i)} \log(h_\theta(x^{(i)}))+(1-y^{(i)}) \log(1-h_\theta(x^{(i)}))\right) \partial J(\theta) \partial x_i = \Sigma - (y-h(x) x_i H_{ij} = \partial^2 J(\theta) \partial x^2 = \Sigma(\partial h(x) \partial \theta_j) x_i = \Sigma(h(x)(1-h(x)) x_j x_i As}$

z$^T Hz \geq 0 is always positive - semidefinite when H \geq 0$

z$^T Hz = z^T(\Sigma(h(x)(1-h(x))xx^T)z = \Sigma(h(x)(1-h(x))(z^T xx^T z) = \Sigma(h(x)(1-h(x))(x^T z)^2$

(x$^T z)^2 is positive, and h(x)(1-h(x) is a bernoulli probability where : 0 \leq h(x) \leq 1 Therefore, the value of that replaces th$ is positive semidefinite, or negative semidefinite. In this case the Hessian is positive semidefinite. So, z$^T Hz \geq 0$