Given the cost function $J(w_0, w_1) = \frac{1}{2m}\sum_{i=1}^{m}\left(w_0 + w_1\mathbf{x}^{(i)} - y_i\right)^2$, determine the definiteness of its Hessian matrix and the convexity of the function. Assume 1-D dataset and $m = 1$. Show your work.