Question 1

   a. $h\theta(x) = \theta^T x$

   b. $J(\theta) = 1/m * \text{sum}(-y * \log(h\theta(x)) - (1 - y) * \log(1 - h\theta(x)))$

   c. $\text{Gradient} = 1/m * \text{sum}(h\theta(x) - y) * x$

   d. $\text{Theta} = \text{theta} - \text{alpha} * \text{gradient} = \text{theta} - \text{alpha} * 1/m * \text{sum}(h\theta(x) - y) * x$

   e. -

Question 2

Univariate linear regression:

$h\theta(x) = \theta_0 + \theta_1 x$

$J(\theta) = 1/2m * \text{sum}((h\theta(x) - y) \wedge 2)$

$\text{Gradient } \theta_1 = \theta_1 - \text{alpha} * 1/m * \text{sum}(h\theta(x) - y) * x$

Minimize $J(\theta)$

$\text{Derivative}(J(\theta)) = 1/m * \text{sum}(h\theta(x) - y) * x$

$1/m * \text{sum}(\theta_0 + \theta_1 x - y) * x = 0$

$\text{sum}(\theta_0 + \theta_1 x - y) = 0 \qquad\qquad \vee \quad x = 0$

$\theta_0 * m + \theta_1 * \text{sum}(x) - \text{sum}(y) = 0$

$\theta_1 * \text{sum}(x) = \text{sum}(y) - \theta_0 * m$

$\theta_1 = (\text{sum}(y) - \theta_0 * m) / \text{sum}(x)$