House prices

1) Implement by hand equations of derivative using LaTeX (I will use similar format in LibreOffice/ODF, sorry)

$$f_x = \frac{\partial f}{\partial x} = \lim_{h \to 0} \frac{f(x+h, y) - f(x, y)}{h}$$
$$f_x = \frac{\partial f}{\partial y} = \lim_{h \to 0} \frac{f(x, y+h) - f(x, y)}{h}$$

why did I wrote them here?

2) Writing equations for housings:

$$dw\, linear : \frac{\delta}{\delta W}[W \cdot x + b] = x$$
$$dx\, linear : \frac{\delta}{\delta x}[W \cdot x + b] = W$$
$$db\, linear : \frac{\delta}{\delta b}[W \cdot x + b] = 1$$

3) Cost function

We will use mean squared error cost function:

$$J(\theta_0, \theta_1) = L_{MSE} = \frac{1}{N} \cdot \sum_{i=0}^{N} (h_\theta(x_i) - y_i)^2$$

where $h_\theta(x_i) = \theta_0 + \theta_1 \cdot x_i$ (is our model)

We need to minimize cost function's result.

4) Gradient descent

The goal of this is to update θ_0, b and θ_1, W to minimize cost function result.

$$\theta_0 := \theta_0 - \alpha \cdot \frac{\partial}{\partial \theta_0} J(\theta_0, \theta_1)$$
$$b := b - \alpha \cdot \frac{\partial}{\partial b} J(b, W)$$

$$\theta_1 := \theta_1 - \alpha \cdot \frac{\partial}{\partial \theta_1} J(\theta_0, \theta_1)$$
$$W := W - \alpha \cdot \frac{\partial}{\partial W} J(b, W)$$

but to simultaneously update both variables we need to assign them to temporary variables first, so b doesn't affect calculation of the W.

α - is a learning rate, which defines how fast we are going to change b and W.

By intuition what is going to happen – partial derivative of the cost function will be a positive slope (will return a positive number) if the mse will on the right side of the local minima, as a result we will subtract a slope value multiplied by learning rate from W (or b). Otherwise we will add it. In ideal situation once MSE is 0 – we don't move anymore.

Sorry, I still don't get how to write the rest. I have watched tons of Khan Academy videos on youtube regarding derivatives. I have watched lessons on Coursera regarding Machine Learning, Cost function, Gradient Descent… All the different notations of the same things drive me crazy.