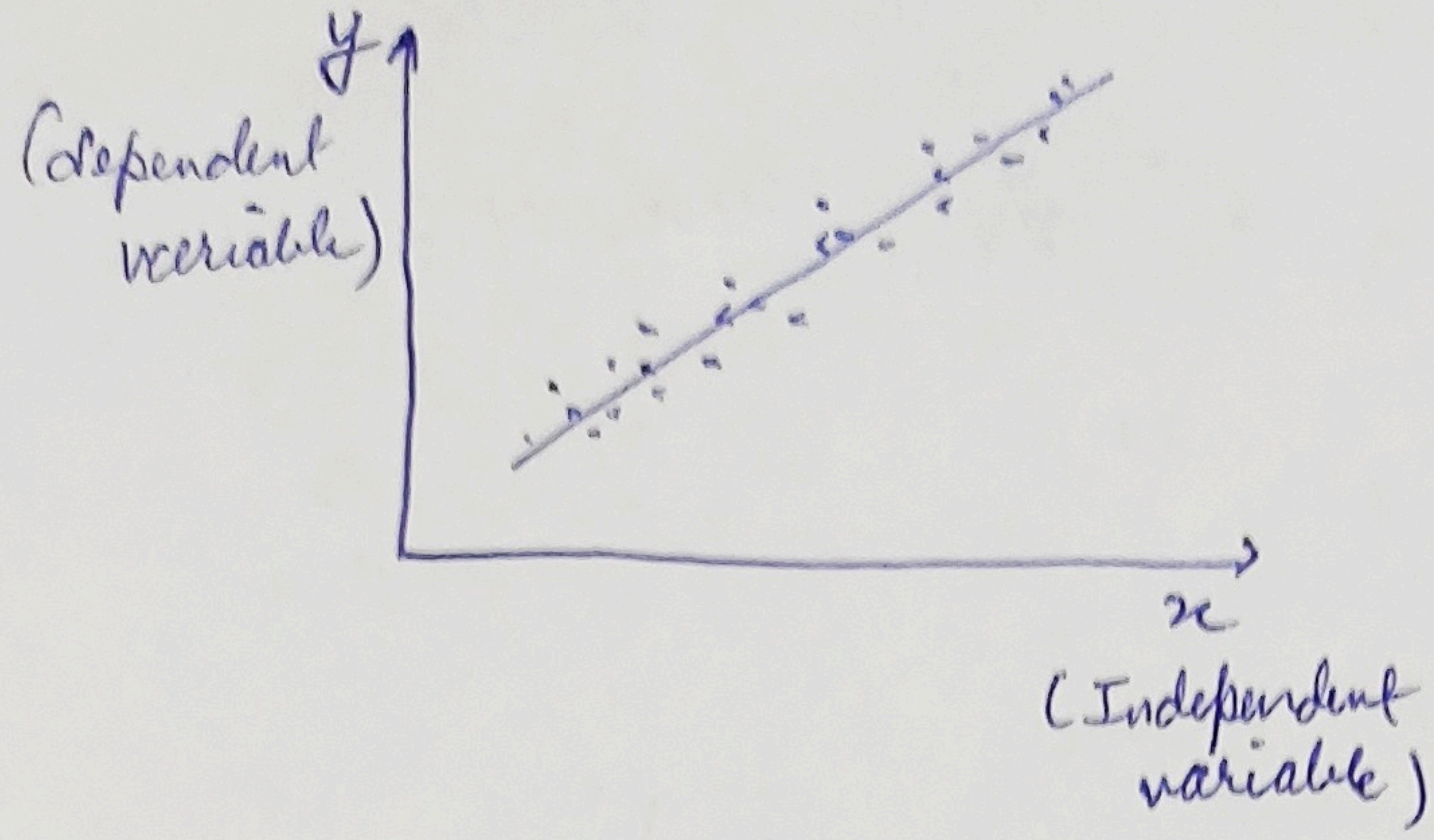
Linear Regression

dependent variable is continuous in nature



$y = 0.9 + 1.2x_1 + 2x_2 + 4x_3 + 1x_4$

When there is only 1 independent variable, we use simple linear regression using simple linear equation.

$$y = \alpha_0 + \alpha_1 x$$

$$y = mx + c$$

When there are more than 1 independent variable we use multiple regression using multiple linear eq^n.

$$y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 \dots \alpha_n x_n$$

α_i = Reg. coff.

x_i = Independent var

y = Dependent var

The coefficient determines the importance of the independent variable in the preceding output.

Mean Squared Error Function

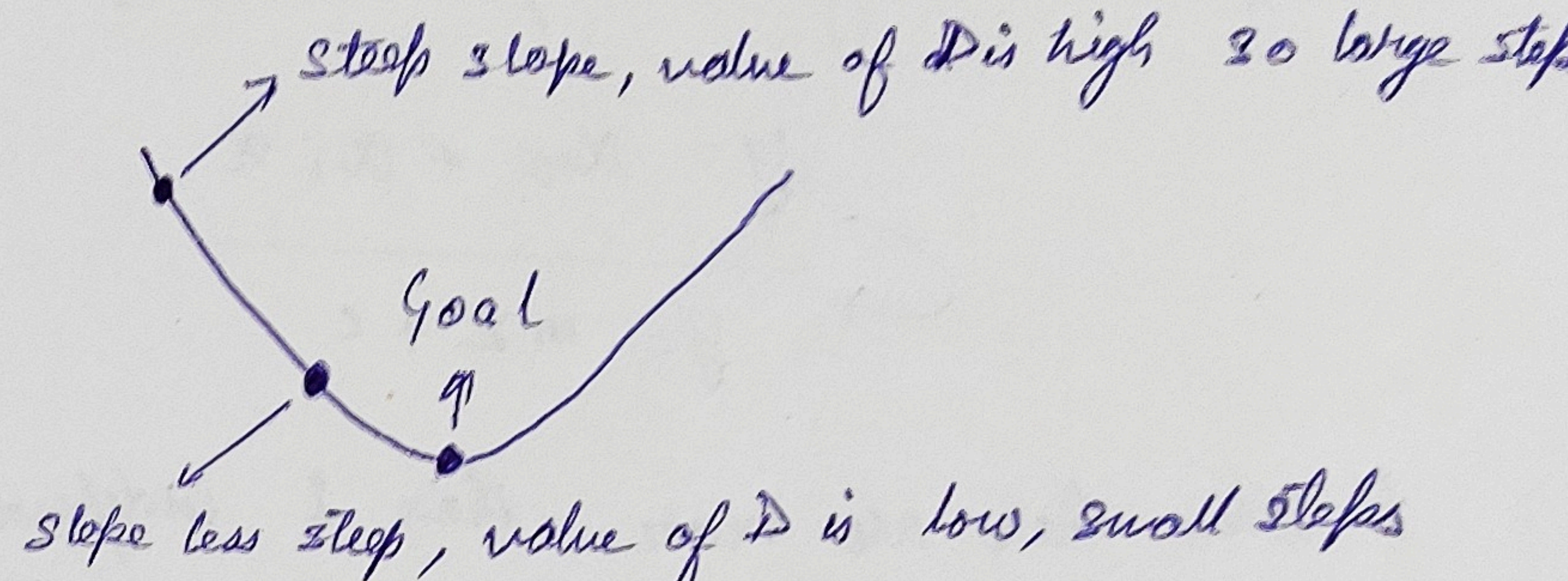
1. Difference between actual value of y and predicted value of y. $(y_i - \bar{y}_i)$

$$\bar{y}_i = m x_i + c$$

2. Square the difference $(y_i - \bar{y}_i)^2$

3. Find mean of the squres $\frac{1}{n} \sum_{i=0}^{n} (y_i - \bar{y}_i)^2$

Gradient descent



Step 1 : Initially :- $m = 0$, $c = 0$, L (Learning rate) $= 0.0001$

Step 2 : Calculate the partial derivative of loss fn wrt m & c

~~wrt m~~

$$D_m = \frac{1}{n} \sum_{i=0}^{n} 2 (y_i - (m x_i + c)) (-x_i)$$

~~wrt c~~ $\cancel{D_c = \frac{1}{n} \sum_{i=0}^{n}}$

wrt m :- $D_m = \frac{-2}{n} \sum_{i=0}^{n} x_i (y_i - \bar{y}_i)$

wrt c :- $D_c = \frac{-2}{n} \sum_{i=0}^{n} (y_i - \bar{y}_i)$

Step 3:-

Update the current value of m & c

$$m = m - L \times D_m$$

$$c = c - L \times D_c$$

Step 4:-

Repeat step 2 & step 3 until loss fn is ideally 0