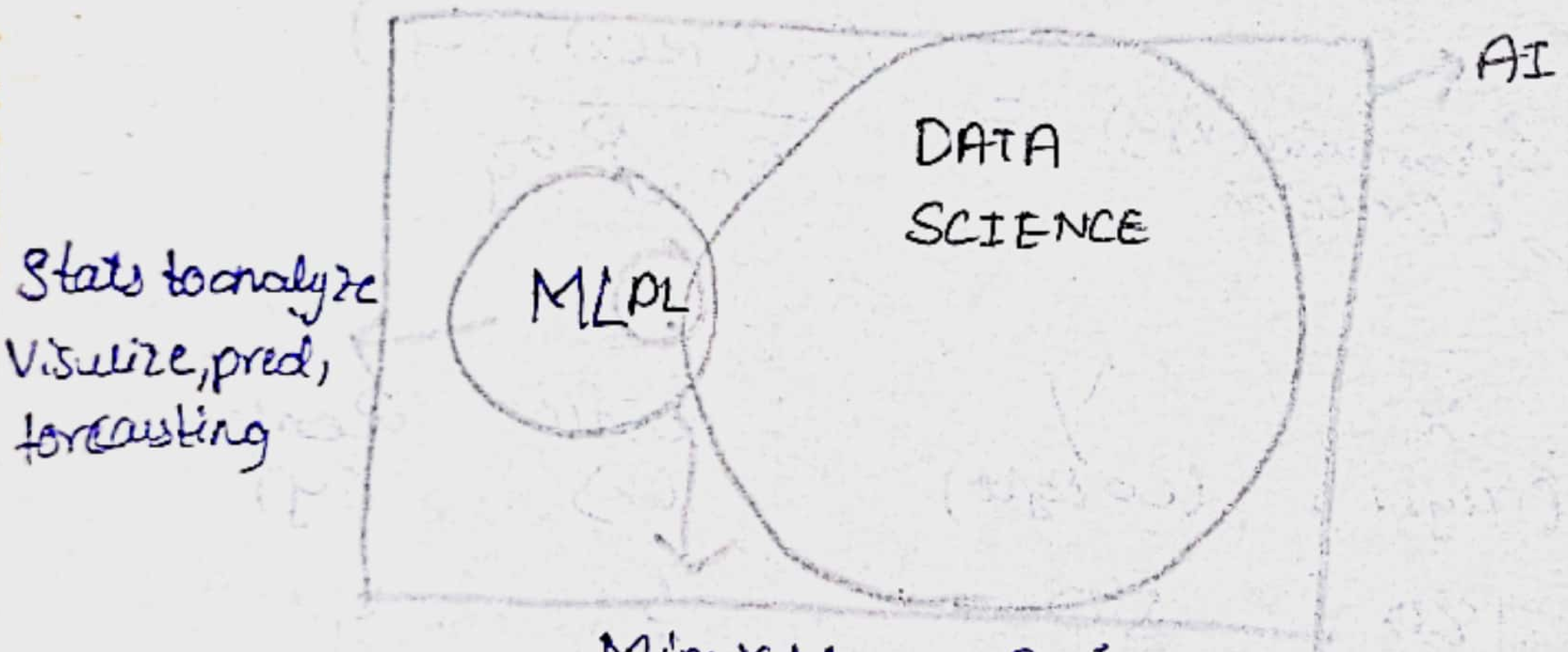
IntroDuction Machine-Learning

Day-1 Agenda

1) Intro (AI VS ML VS DL VS DS)
2) Supervised & Unsupervised
3) Linear Regression
4) R^2 & Adjusted R^2

1. AI VS ML VS DL VS DS



Mimic Human Brain, Multi Layered Neural Network

application of AI:-

i) able to do own task without any Human intervention

Eg:- i) Netflix :- movie recomendation
ii) Prime :- buy a product after show other stuff related products
iii) Self Driving Cars

2. M.L & D.L

- Supervised ML
  - Regression
  - classification
- Unsuprivised ML
  - clustering
  - Dimensionality Reduction

Supervised M.L

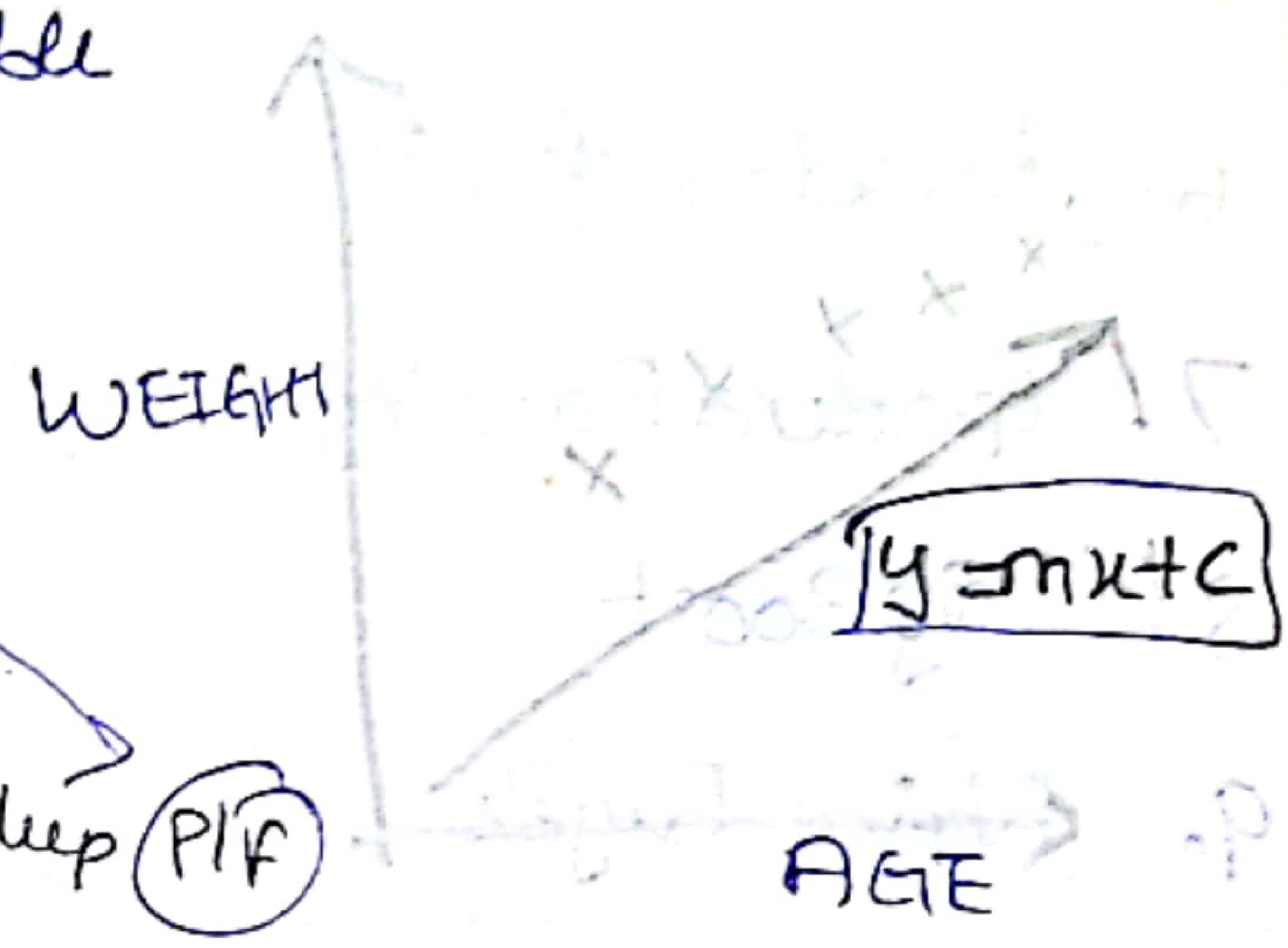
AGE	WEIGHT
18	75
20	76
22	78
24	80
26	88

Inpendent feature:- AGE

Depedent :- Weight

AGE → $\boxed{\text{Hypothesis}}$ → weight (o/p)

1. Regression:- Continous Variable (o/p)



2. Classification:- fixed number category (o/p)

No. of Hrs	No. of play	No. of sleep	P/F
—	—	—	P
—	—	—	F
—	—	—	P
—	—	—	P

Unsupervised ML

1.) Clustering:- grouping algorithm Segmentation (o/p)

2.) Dimensionality reduction

1000 → Lower Dimension

↳ (100)

[PCA, LDA]

SUPERVISED

1. Linear Regression
2. Ridge & Lasso
3. logistic Regression
4. Decision Tree
5. Ada Boost
6. Random forest
7. Gradent Boosting
8. XgBoost
9. Naive Baye's
10. SVM
11. KNN

UNSUPERVISED

1. KMeans
2. DBScan
3. Hiearchal Clustering
4. KNN ||
5. PCA
6. LDA

Best fit:-

Sum of distance

Predicted point

Linear Regression :-

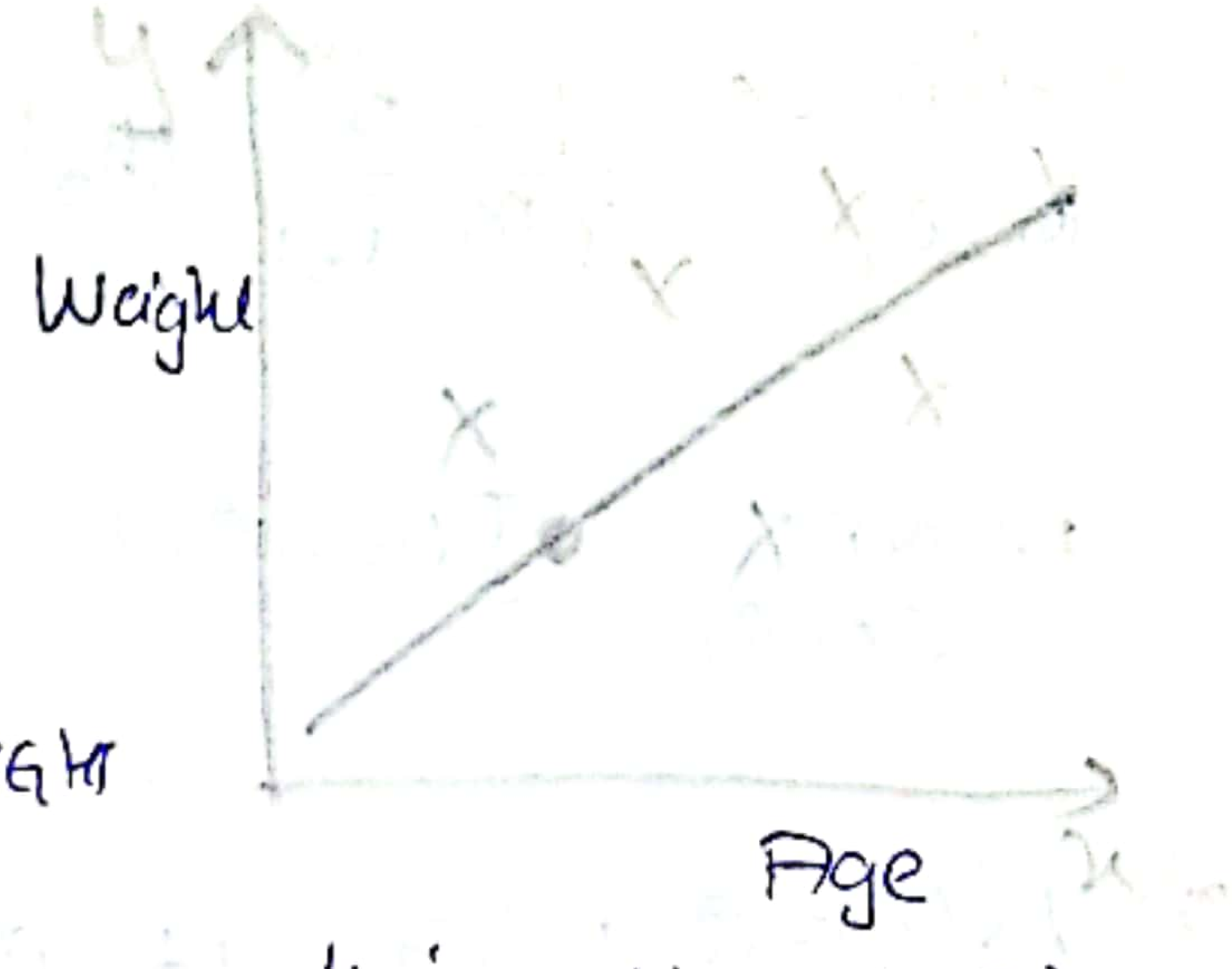
Train Dataset

↓

MODEL

↓

AGE → Hypothesis → WEIGHT



y is a linear function of x

Equation :- $Y = mx + c$,

$y = B_0 + B_1 x$

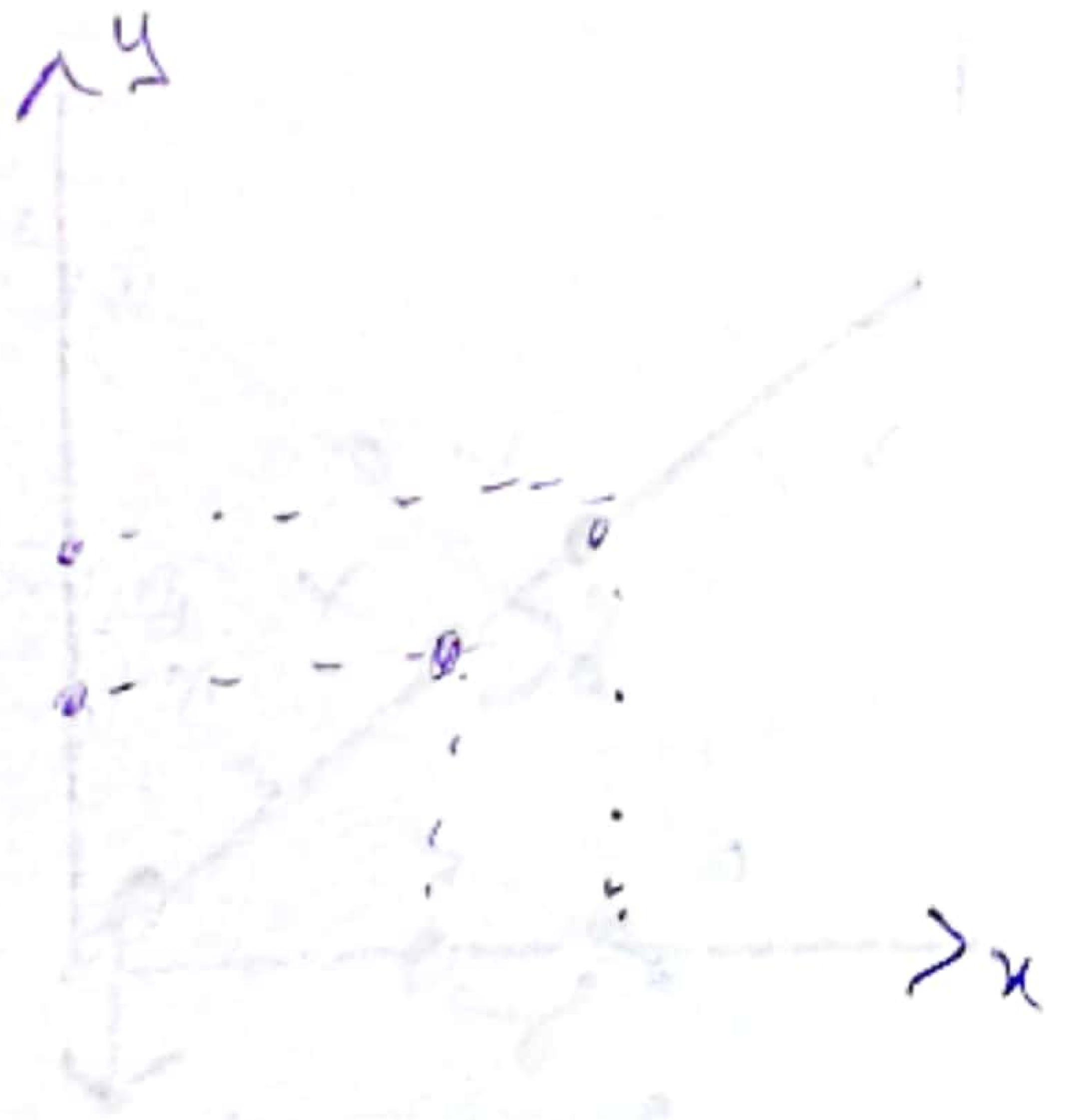
$h_\theta(x) = \theta_0 + \theta_1 x$ etc

Equation of a straight line

when $x=0$ it is intercept

$Y = \cancel{m}\, mx + c$

The unit movement in y is slope (m)



Cost function

if $h_\theta(x) = \theta_0 + \theta_1 x$ equation

at which $Y=0$ is C

1st Unit movement in Y axis is slope(m)

$$\boxed{J(\theta_0, \theta_1) = \frac{1}{2m} \sum_{i=1}^{m} (h_\theta(x)^i - y)^2}$$

↓

Squared Error function

(To find the best fit line)

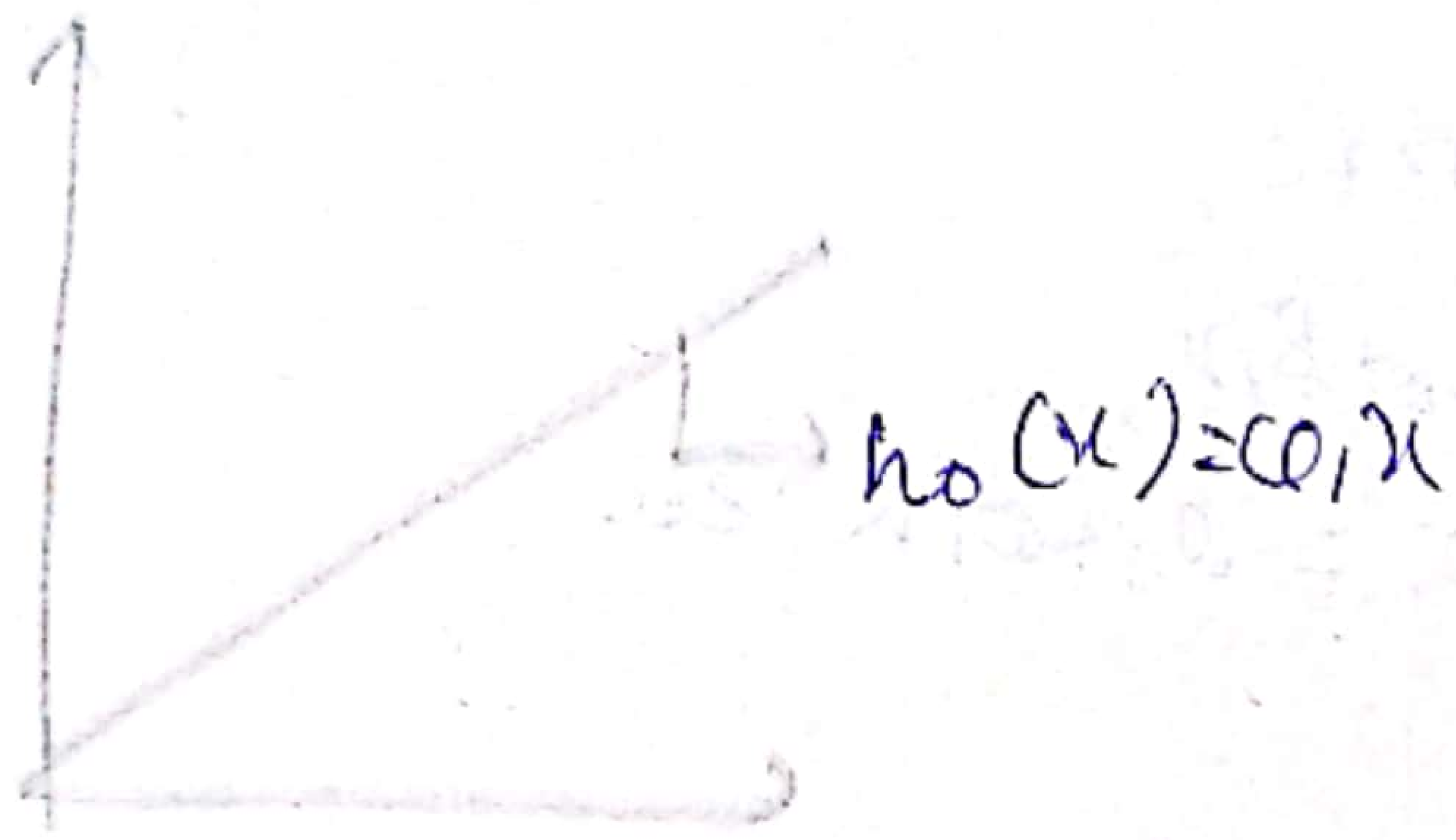
What we need to solve

$$\underset{\theta_0,\theta_1}{\text{minimize}} \quad \frac{1}{2m}\sum_{i=1}^{m}\left(h_\theta(x^{(i)})-y^{(i)}\right)^2$$

⇓

$$\underset{\theta_0,\theta_1}{\text{minimize}} \quad J(\theta_0,\theta_1)$$

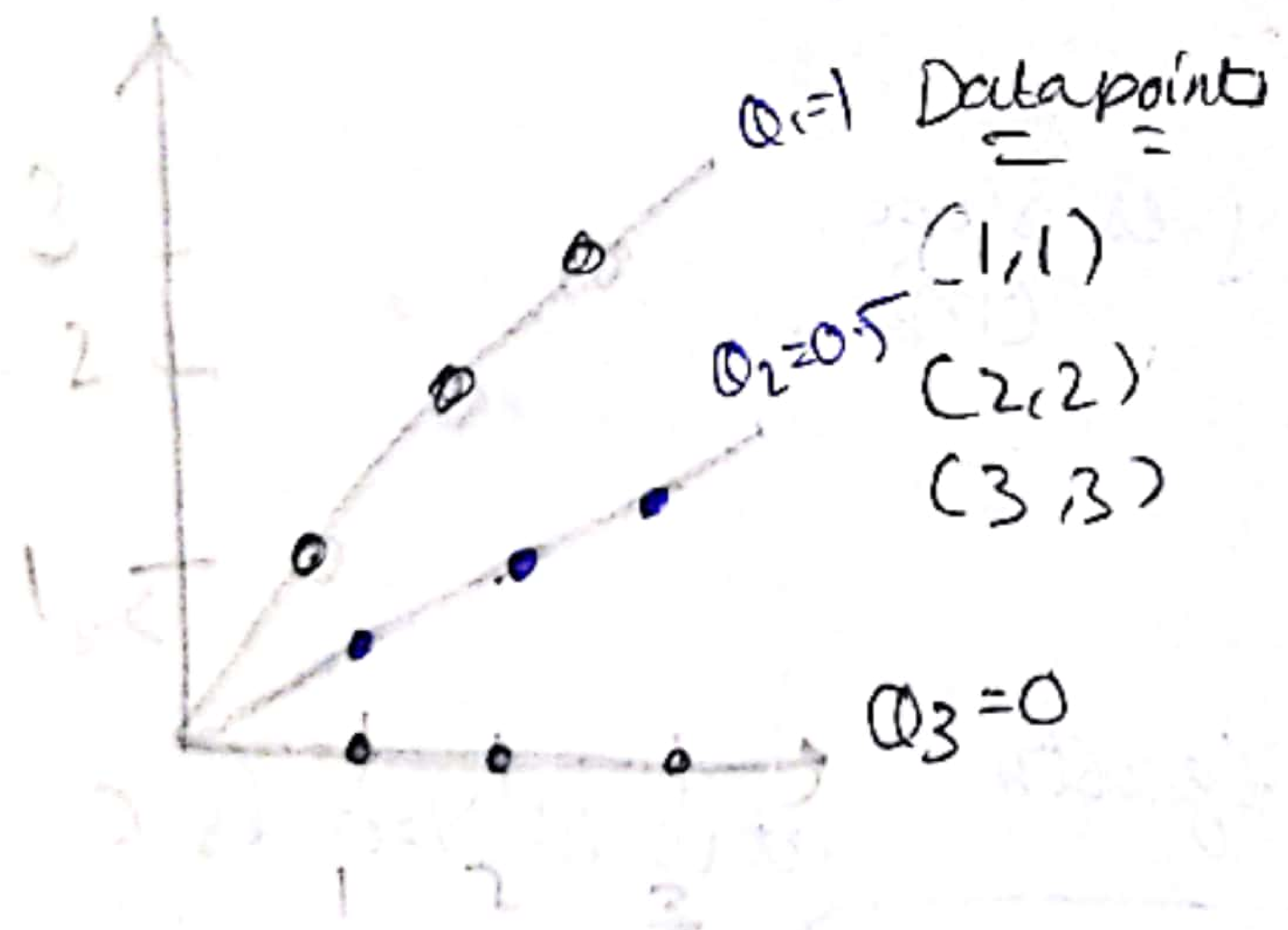
* $h_\theta(x)=\theta_0+\theta_1 x$ if $\theta_0=0$



$h_\theta(x)=\theta_1 x$

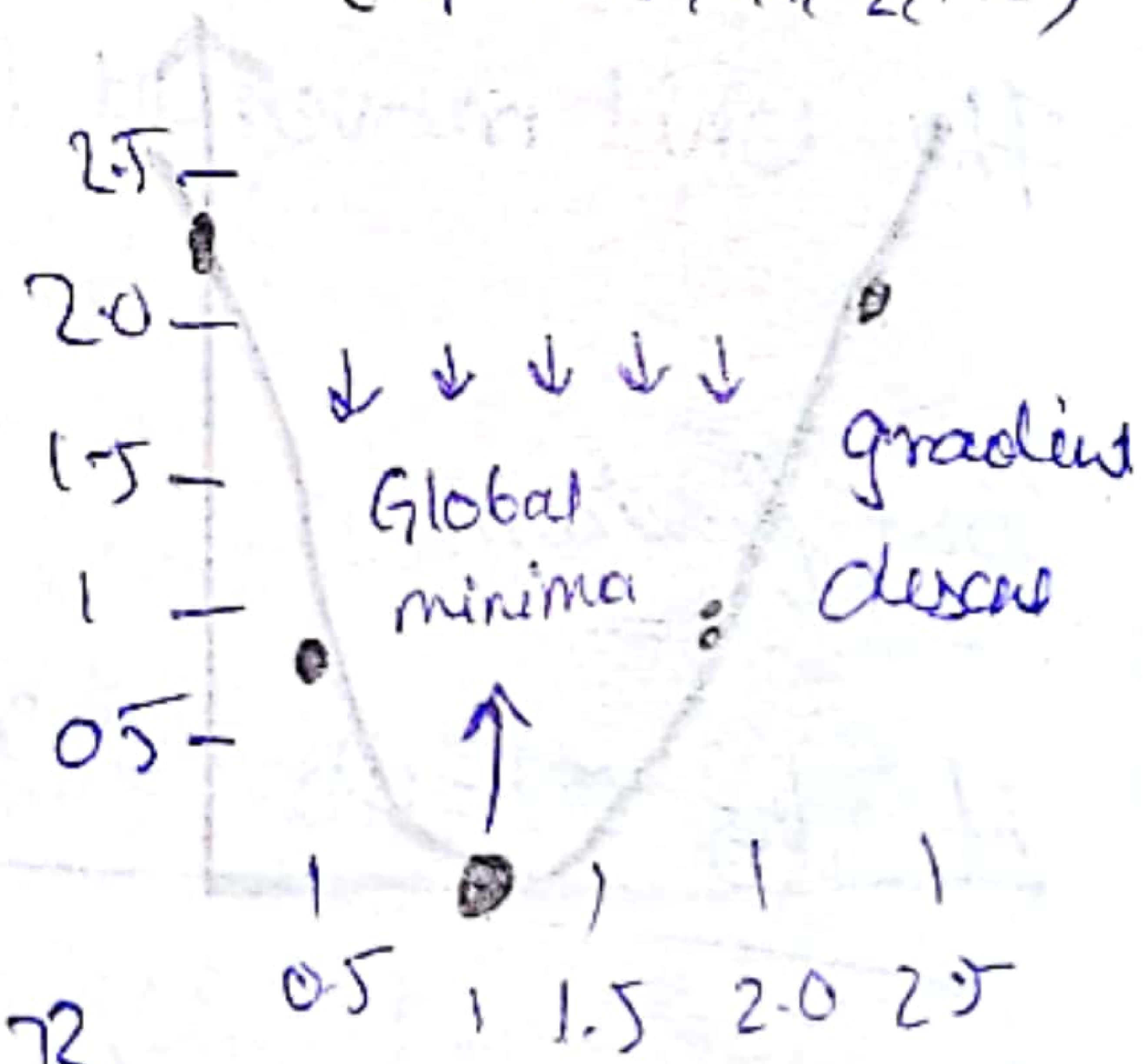
1) $\theta_1=1$

$\theta_1=1$



Cost function (after solve)

(θ_1 = values, 0, 1, 2, ---)



$$J(\theta_1)=\frac{1}{2m}\sum_{i=1}^{3}\left(h_\theta(x)^{i}-y^{(i)}\right)^2$$

$$=\frac{1}{2m}\left[(1-1)^2+(2-2)^2+(3-3)^2\right]$$

$$=\frac{1}{2\times 3}[3]$$

$$\theta_1=\frac{1}{2}=0.5$$

2.) $\theta_1 = 0.5$

$$J(\theta_1) = \frac{1}{2m} \sum_{i=1}^{3} (h_\theta(x)^i - (y)^i)^2$$

$$= \frac{1}{2\times3} [(0.5-1)^2 + (1-2)^2 + (1.5-3)^2]$$

$$= 0.58$$

3.) $\theta_s = 0$

$$J(\theta_1) = \frac{1}{2\times3} [(0-1)^2 + (0-2)^2 + (0-3)^2]$$

$$= \frac{1}{6} [1+4+9]$$

$$= 2.3$$

Converge algorithm.

Repeat Until Convergence

{

$$\theta_j = \theta_j - \alpha \underbrace{\boxed{\frac{\partial}{\partial \theta_j} J(\theta_0, \theta_1)}}_{\text{Slope}}$$

}

Gradient Descent Algorithm

repeat Until Convergence

{

$$\theta_j = \theta_j - \underbrace{\boxed{\alpha \frac{\partial}{\partial \theta_j} J(\theta_0, \theta_1)}}_{\text{Slope}}$$

}

Hypothesis metrics

R^2 - used check how good is the model is