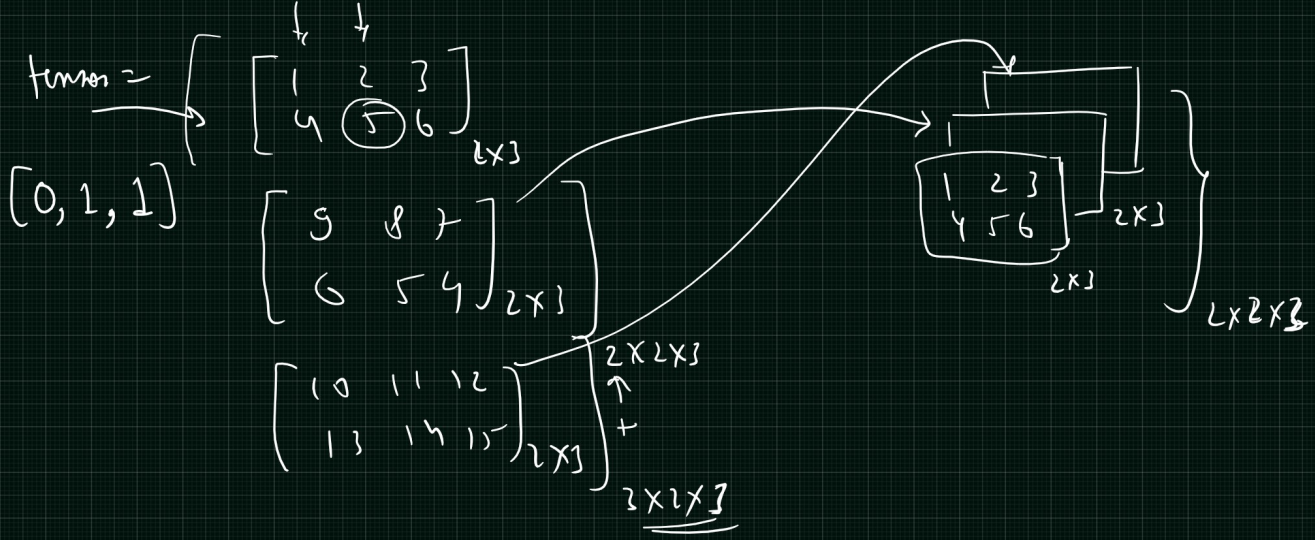


Experiment 1

$W_1 = 2$
$W_2 = 3$

Experiment 2

$W_1 = -2$
$W_2 = -3$

Experiment 3

$W_1 = -10$
$W_2 = -20$

Experiment

$W_1 = 10$ ✓
$W_2 = 12$ ✗

Random seed = 42 | 2021

$W_1 = 5$
$W_2 = 6$

$$\left[\begin{array}{cc|c} W_1 & W_2 & b_1 \\ W_3 & W_4 & b_2 \end{array}\right]$$

1 sec 1 sec 1 sec

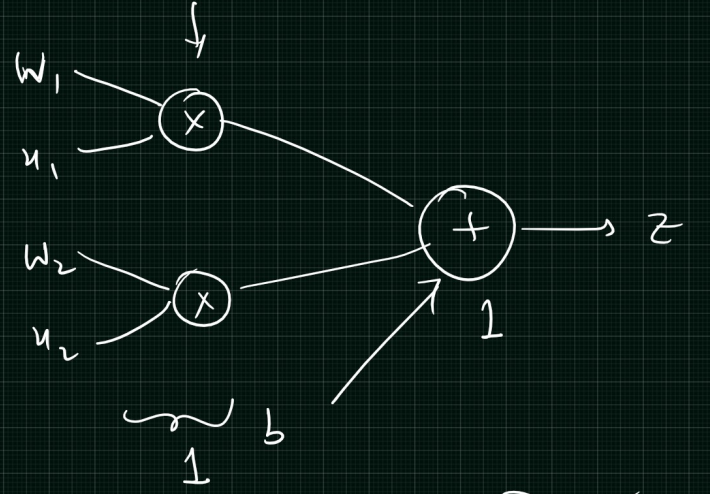
$z = w_1 x_1 + w_2 x_2 + b$

$a_1 + a_2 + a_3 =$

1 + 1 + 1

1 sec

Total time = 4 sec



2 sec

23 mins Remainder

2 min

$\frac{23}{2}$

$f(x,y) = x^2 + y^2$

$\frac{\partial f}{\partial x} = 2x + 0 = 2x$

$x = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}_{2\times 2}$ $y = \begin{bmatrix} 3 & 3 \\ 3 & 3 \end{bmatrix}_{2\times 2}$

$f = x^2 + y^2$

$\frac{\partial f}{\partial x} = 2x$ $2\begin{bmatrix} \quad \end{bmatrix}_{2\times 2}$

$$f(x,y) = \sqrt{x^2+y^2}$$

$$\frac{\partial f}{\partial x} = \frac{1}{2\sqrt{x^2+y^2}} \times 2x = \frac{x}{\sqrt{x^2+y^2}}$$

$$\left.\frac{\partial f}{\partial x}\right|_{x,y} =$$

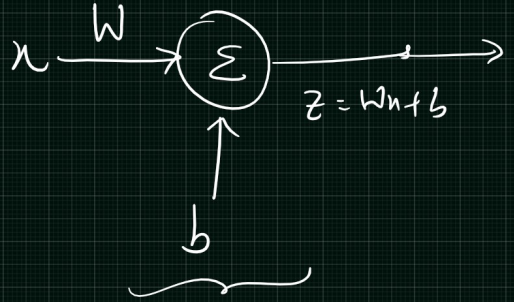
$x=3$
$y=2$

$$\left.\frac{\partial f}{\partial x}\right|_{x=3,\ y=2} = \frac{3}{\sqrt{3^2+2^2}} = \frac{3}{\sqrt{9+4}} = \frac{3}{\sqrt{13}}$$

$$\frac{x}{\sqrt{x^2+y^2}} \qquad \frac{x}{\sqrt{x\cdot x + y\cdot y}}$$

Regression Example.

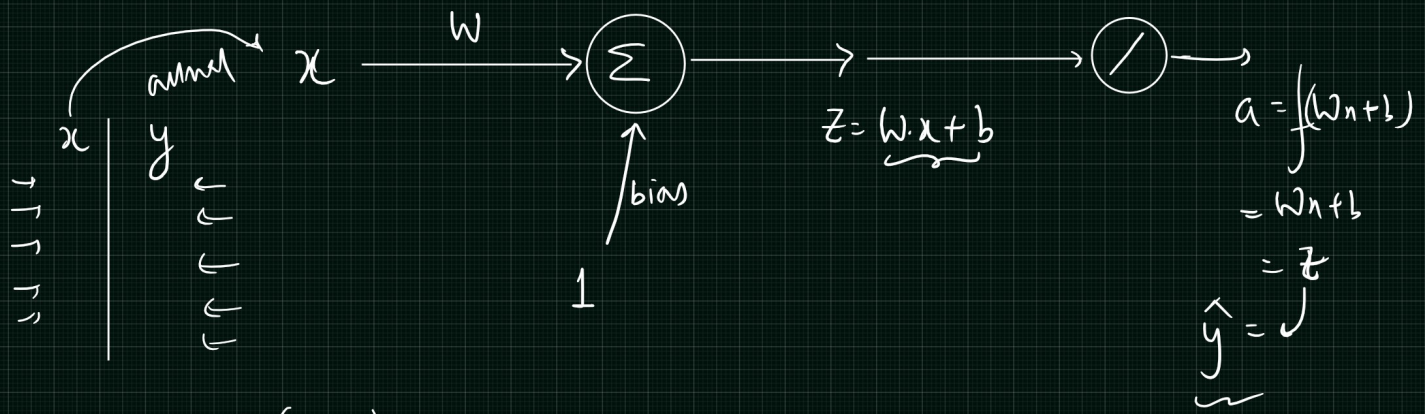
$(-\infty, \infty)$



$$\left.\begin{aligned} W &= W - \eta\frac{\partial C}{\partial W} \\ b &= b - \eta\frac{\partial C}{\partial b} \end{aligned}\right\} \qquad \begin{aligned} W &-= \eta\frac{\partial C}{\partial W} \\ b &-= \eta\frac{\partial C}{\partial W} \end{aligned}$$

True b ✓ True w ✓

$f(n) = n$



$C(x, y)$

$$\nabla C(x,y) = \frac{\partial C}{\partial x}\hat{i} + \frac{\partial C}{\partial y}\hat{j}$$

$C(w, b)$

$$\nabla C(w,b) = \frac{\partial C}{\partial w}\hat{i} + \frac{\partial C}{\partial b}\hat{j}$$

$$\nabla C(w,b)\Big|_{\text{current } w,b}$$

10 batch size: 4

$\frac{10}{5} = 2$