How much Error is there for the points (1,3), (2,6), (3,8), (4,6) of fitted with the line y=1.1x+3?

O.	X	y=1,1x+3	E_i	
(1,3)	1	4.1	4.1-3 = 1.1	E=1.17 (-0.8)7
(2,6)	2	5.2	6.3-8 = -1.7	(-1.7)2+(1.4)2
(3,8)	,,	6.3	7.4-6=1.4	-6.004 4
(4,6)	9	7.4	1	= 6.7

How do we minimize error?

Can me use a different line? $y = A \times + B$ Error only depends on A and B

can use optimization with partial derivatives.

ex find the straight line that minimizes the error for the points (1,4), (2,5), (3,8) E, = A.(1) + B - 4 Ez = A. (2) + B - 5 Ez = A-(3)+B-8 Total error E = (A + B - 4) + (ZA+B-5) + (3A+B-8) 2 E is a function of A & B. want to find (A,B) that minimizes E(A,B) $\frac{\partial E}{\Delta A} = 2(A+B-4) + 2(2A+B-5) \cdot 2 + 2(3A+B-8) \cdot 3$

= 28A + 128 - 76 $\frac{\partial E}{\partial 8} = 2(A+B-4) + 2(2A+B-5) + 2(3A+8-8)$ = 12A + 6B - 34

 $\begin{cases} 28 A + 178 - 76 = 0 \\ 12 A + 68 - 34 = 0 \end{cases}$ diride top by 2

subtract 2nd from 1st

\[
 \begin{align*}
 & 14A + 6B &= 38 \\
 & 12A + 6B &= 34
 \end{align*}
 \]

[A = 2]

24+68=34 $6\beta = 10 \Rightarrow \left[\beta = \frac{5}{3}\right]$

17(2)+68=34

Y = Zx + 5 minimites error.





Given points (1, 9), (2,8), (3,6), (4,5) which line below Lits best? (has smallest error) A) y=-7x+12 B) y = -2x + 11 (1,9) (2,8) (3,6) (4,3) Total Error 4=-2x+12 (1,10) (2,8) (3,6) (4,4) 12+02+12=Z

Both have some error

y = -2x+11 (1,9) (2,7) (3,5) (4,3) $0^2 + 1^2 + 1^2 + 0 = 2$

Data:

$$E = (9A + 8 - 8175)^{2} + (10A + 8 - 8428)^{2} + (12A + 8 - 8996)^{2} + (13A + 8 - 9255)^{2}$$

$$E_{A} = 18(9A + 8 - 8175) + 20(10A + 8 - 8428) + 24(12A + 8 - 8996) + 26(13A + 8 - 9255)$$

$$E_{B} = 2(9A + 8 - 8175) + 2(10A + 8 - 8428) + 2(12A + 8 - 8996) + 2(13A + 8 - 9255)$$

$$E_8$$
: 88A + 8B = 69708

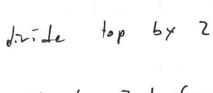
$$A = \frac{1364}{5}$$
, $B = \frac{57127}{10}$

40 $y = 272.8 \times + 5712.7$

$$\begin{cases} 28A+17B-76=0\\ 12A+6B-34=0\\ 28A+12B=76\\ 12A+6B=34\\ 14A+6B=38\\ 112A+6B=34\\ 12A+6B=34\\ 12A+6B=34\\$$

12(2)+68=34

24+6B=34



[A = 2]

 $6B = 10 \Rightarrow B = \frac{5}{3}$

Y = Zx + 5 minimizes error.

points (1, 4), (2,8), (3,6), (4,3) which line below Lits best? (has smallest error) A) y=-7x+12 B) y = -2x + 11 (1,9) (2,8) (3,6) (4,3) Total Error 4=-2x+12 (1,10) (2,8) (3,6) (4,4) 12+02+02+12=Z y = -2x+11 (1,9) (2,7) (3,5) (4,3) $0^2 + 1^2 + 1^2 + 0 = 2$

Both have some error