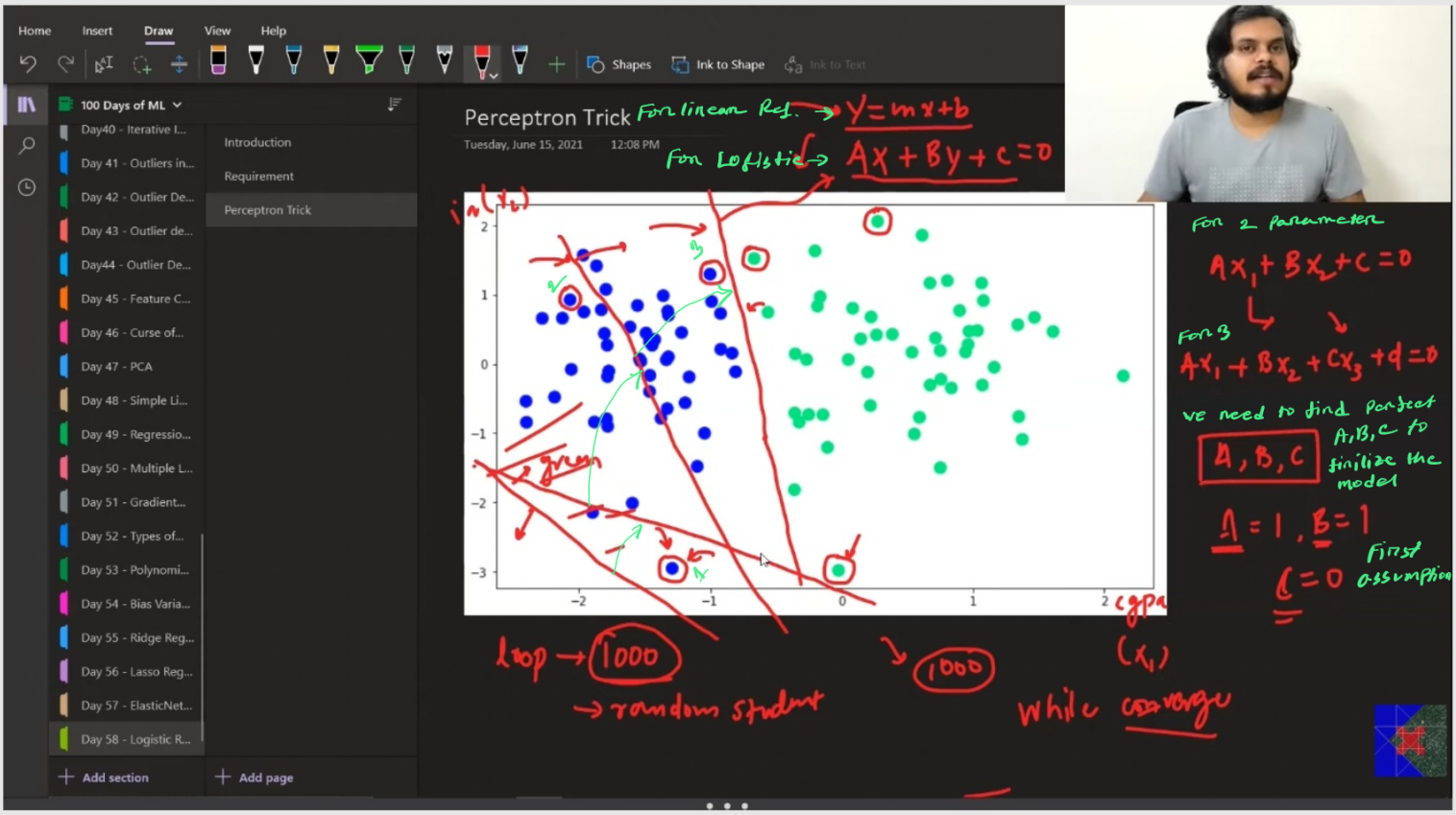
→ Two point of view to learn Logistic Regression.

1) Geometric
2) Probability.

→ Requirement:

* The Dataset need to be linearly seperable.

→ Perception trick is not the optimal solution for logistic regression.



→ Here the positive side of the line is green and negative side is blue.

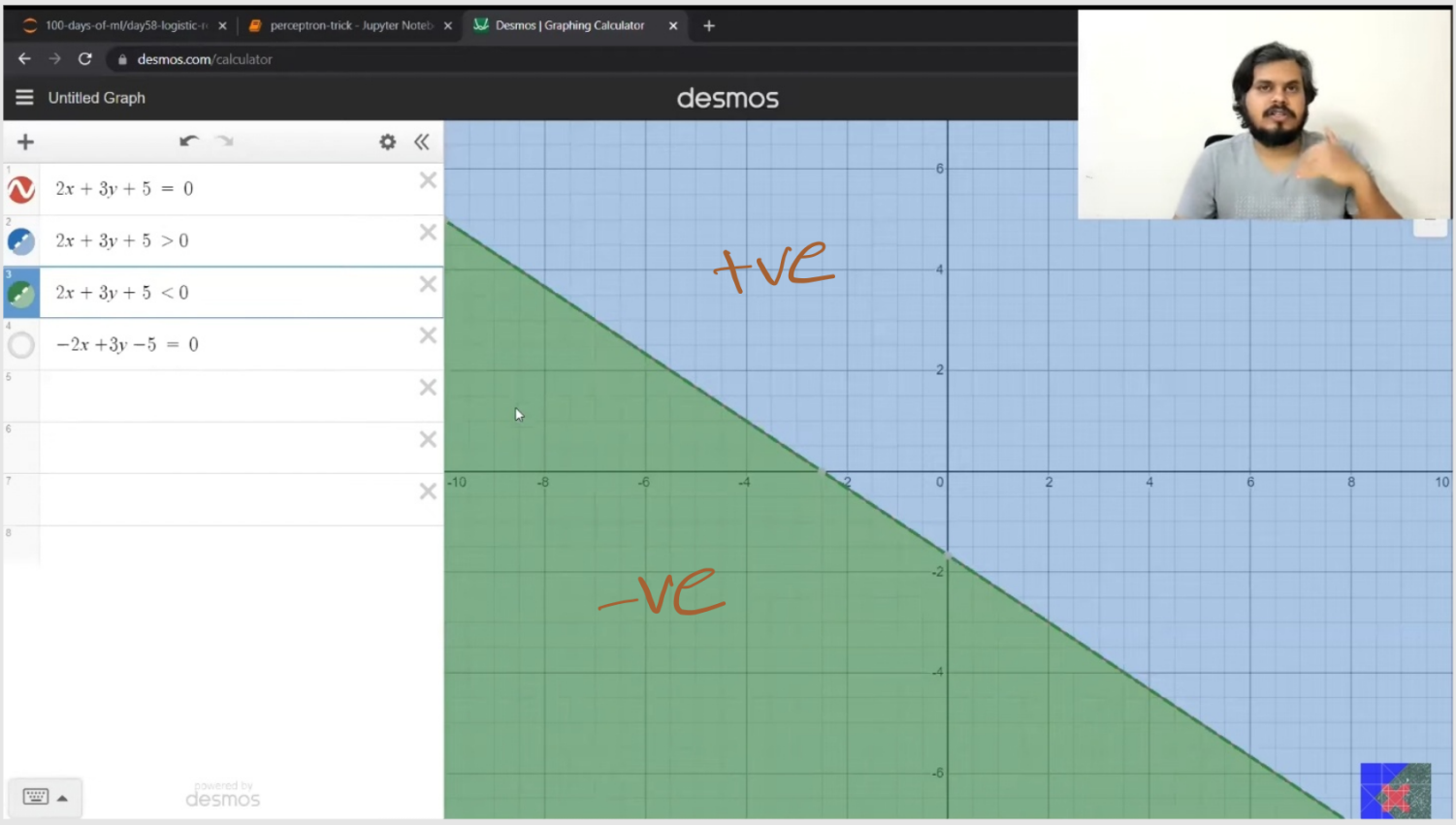
→ So, after the first assumption we draw a line and ask any point that is he in the right side.

→ If he is in right side we do nothing.

→ Else we use transformation to move the line toward that misplaced point.

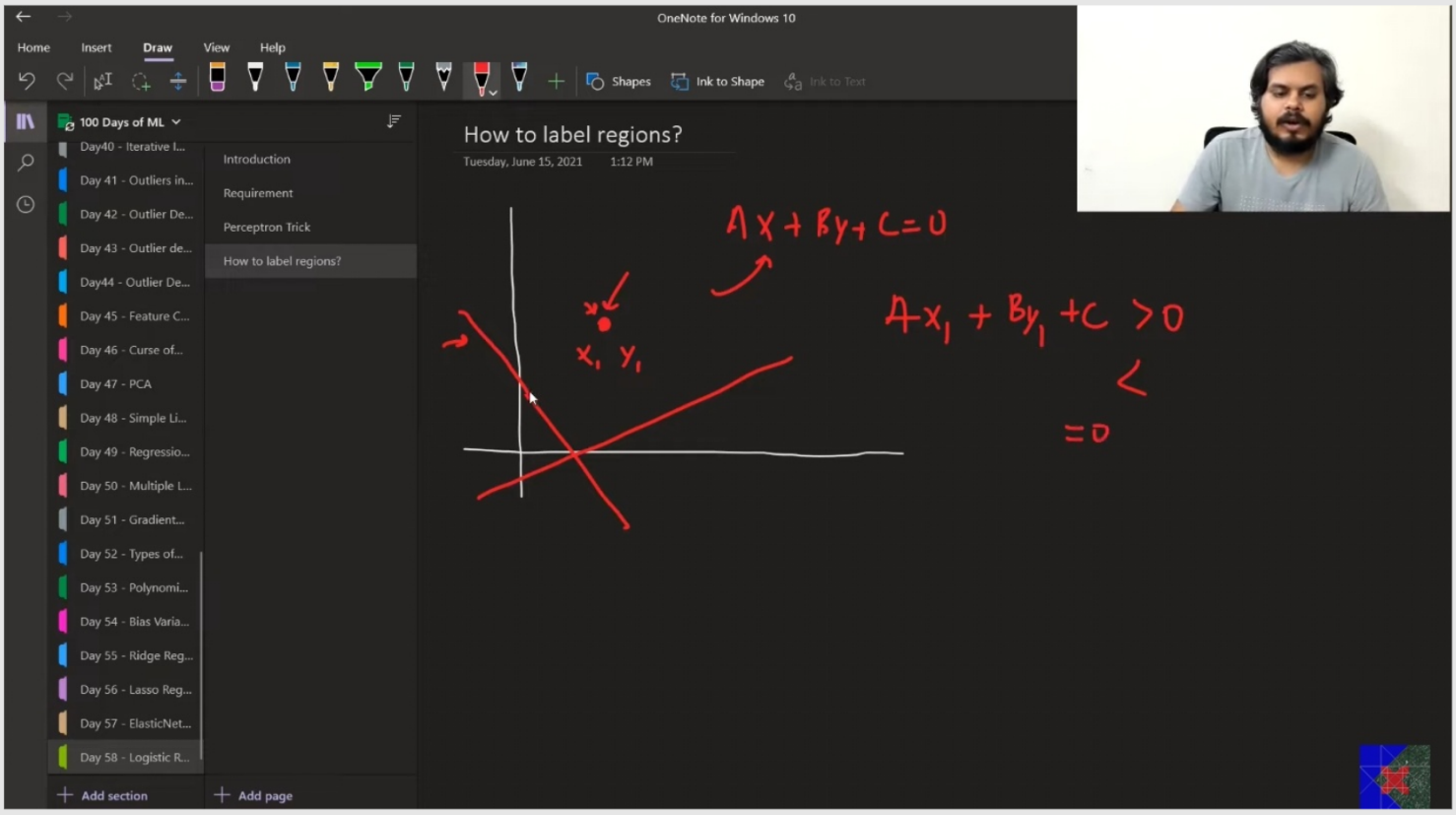
→ We do this for a fixed time epoch or check for the

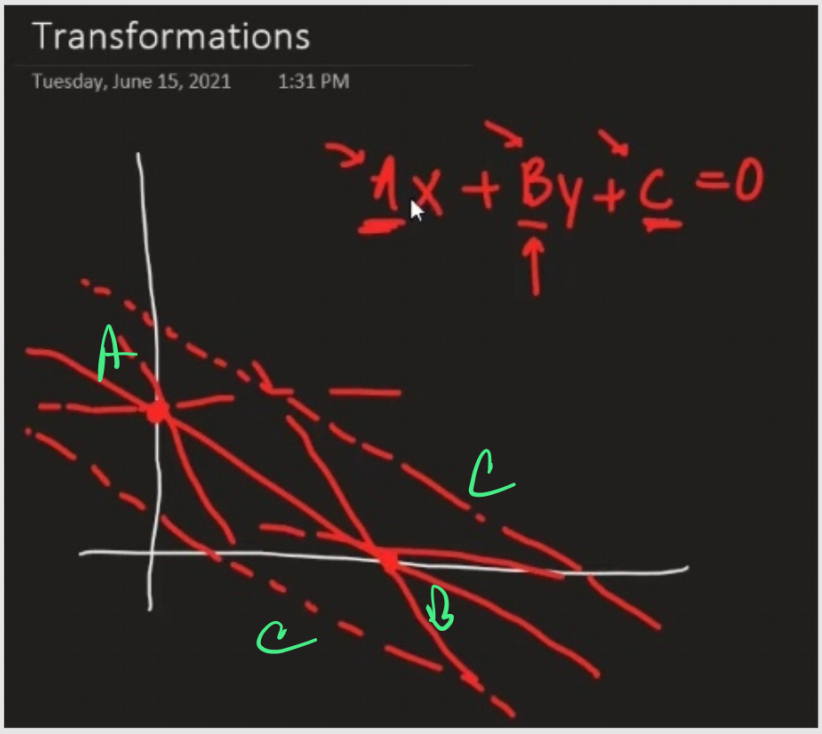
convergence, mean, if there is any misplaced point or not. if not, break.



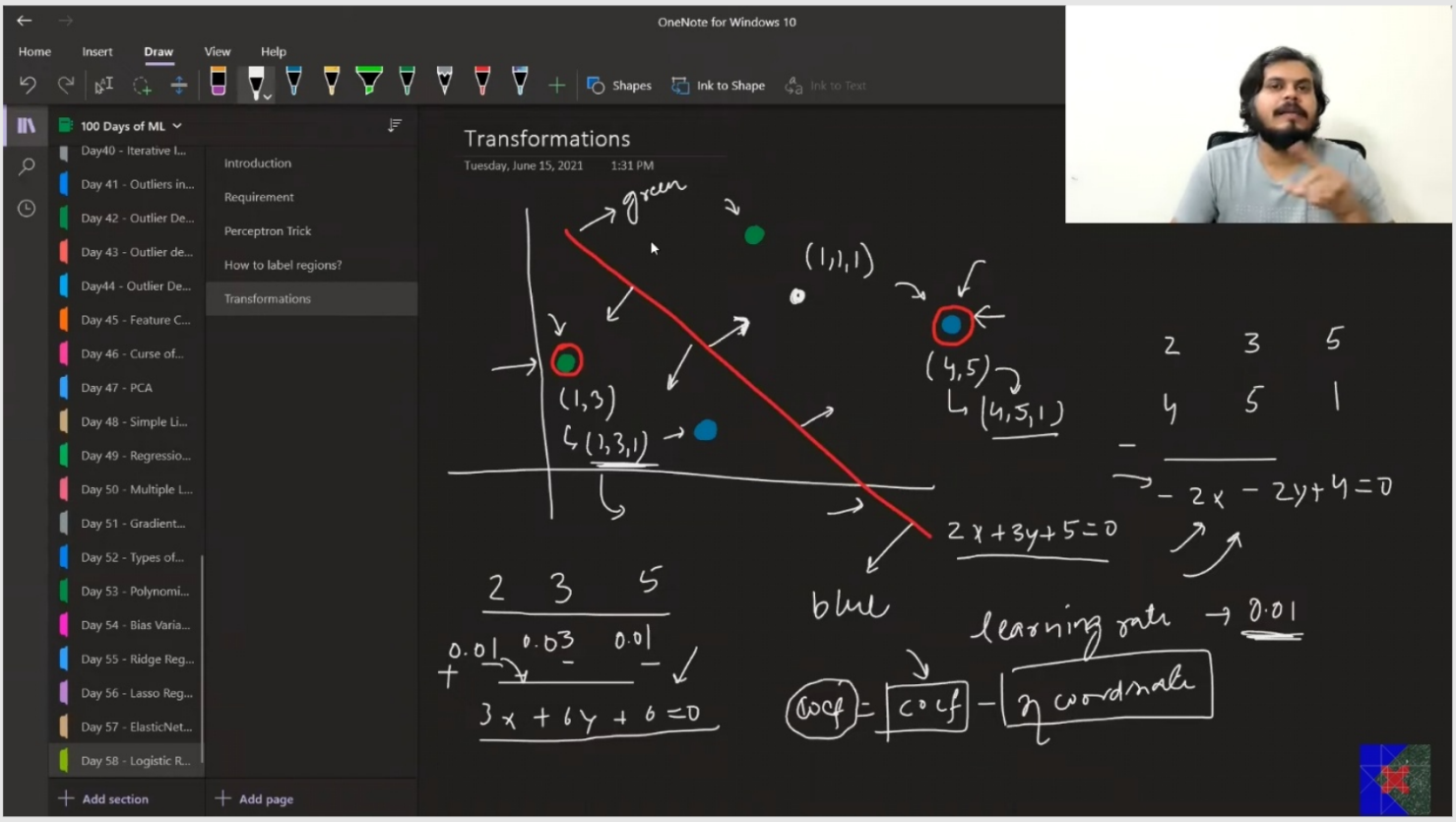
→ It is how you can find out the positive and negative side of a line.

→ After assigning the value of a point to the line equation we will get the side is +ve or -ve.





→ changing in different Param- of the line equat- gives us different transformation.



→ so, how we transfer the line toward that misplaced point.

→ For a point we have (x, y)

→ Here e.g. (4, 5)

→ We add 1 to last — (4, 5, 1)

→ And substract it from A, B, C of the line equation.

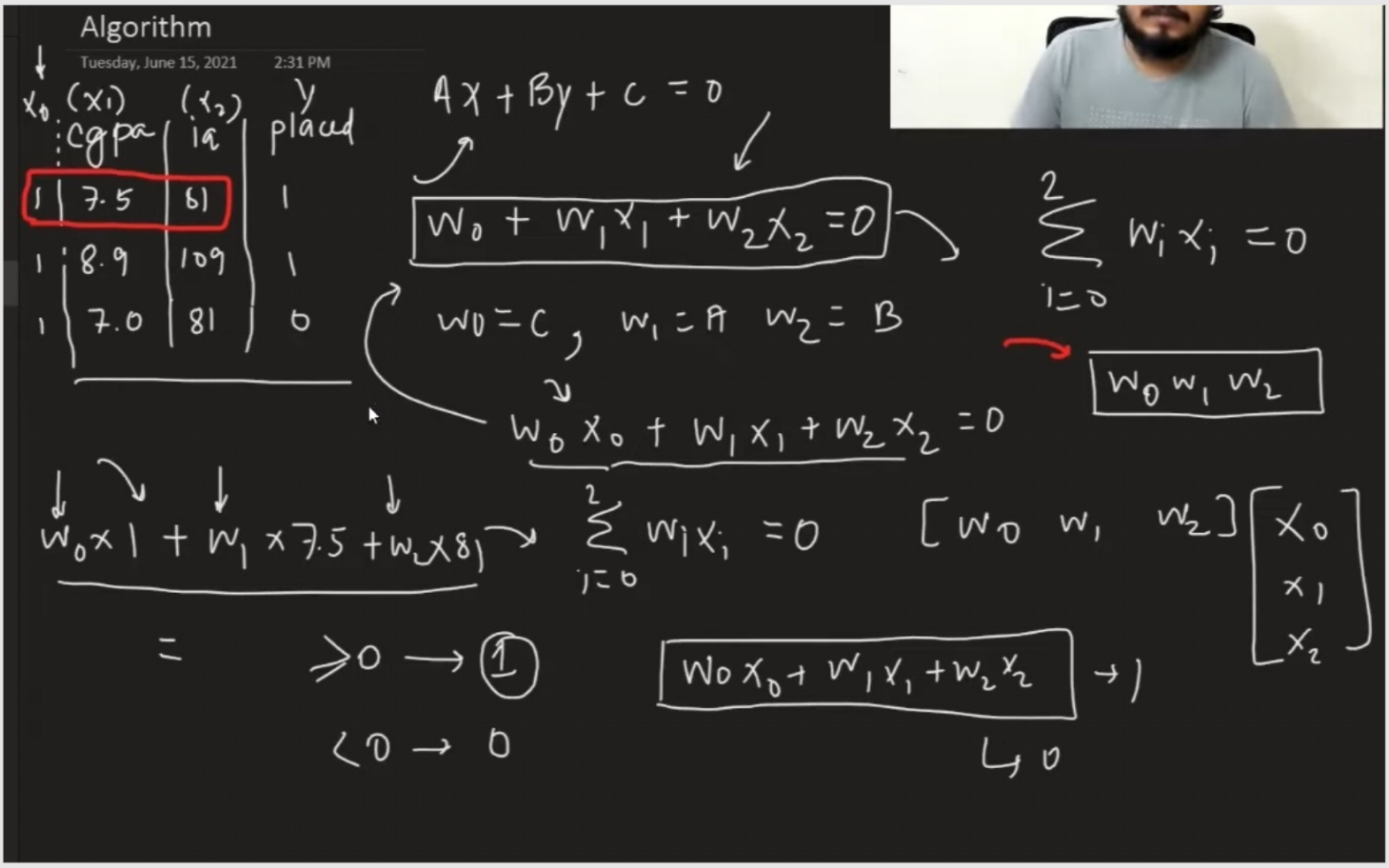
→ Then the line transform and the point goes to the negative side if it is the negative (blue) point.

→ In machine learning we don't use big change at once.

→ That's why we use learning Rate,

$$\text{Coef} := \text{Coef} - \alpha \times \text{Cord of point.}$$

→ <u>Algo</u>:



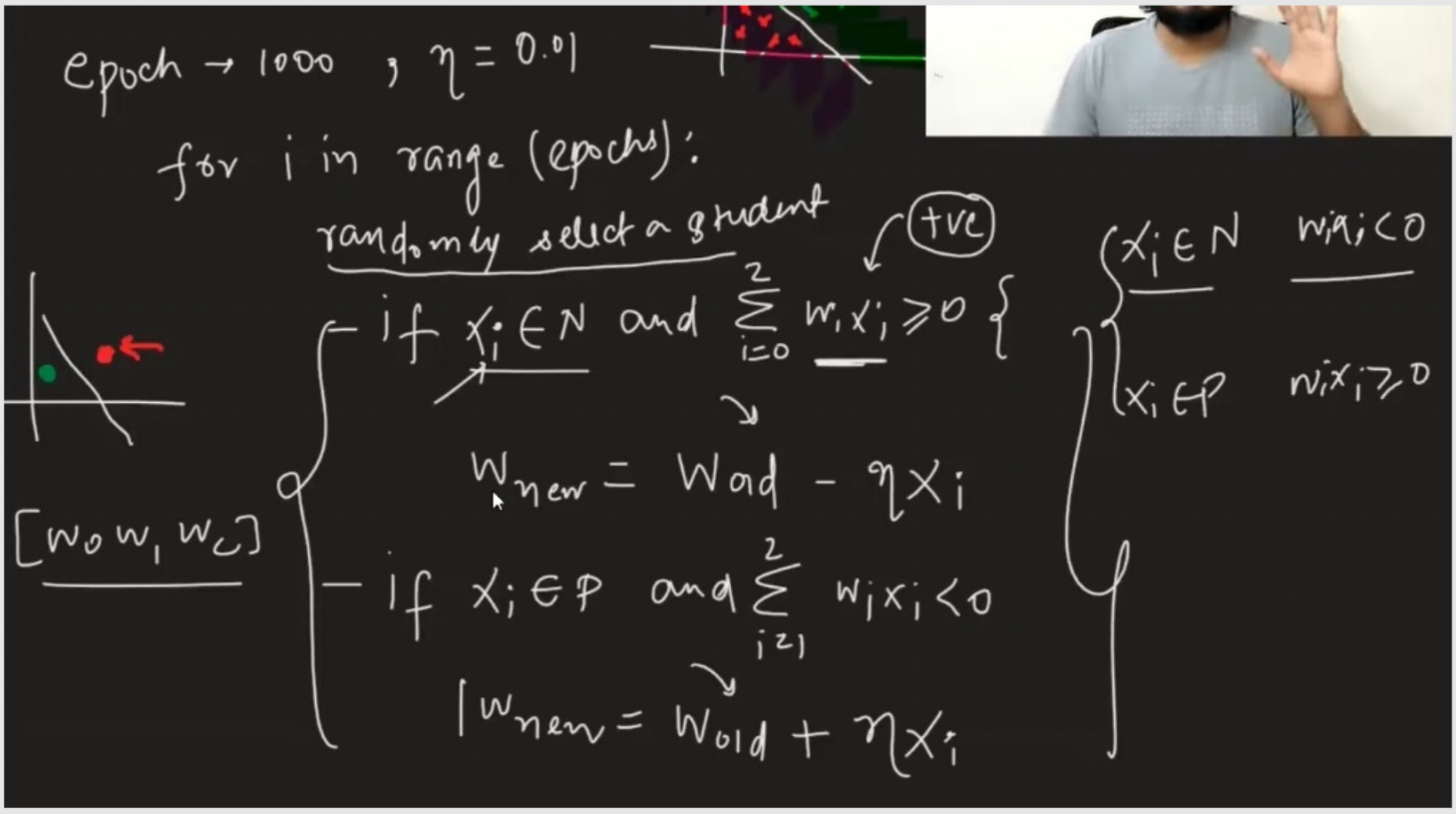
→ A small change in data, and equation,

→ we add a colum of 1 at the first colum of dataset.

→ We transform the $Ax_1 + Bx_2 + C = 0$ to the matrix form.

$$w_0 x_0 + w_1 x_1 + w_2 x_2 = 0$$

$$\sum_{i=0}^{n} w_i x_i = 0 \quad / \quad \vec{w} \cdot \vec{x}$$



→ The Algorithm.

→ simplifying the Algo:

Simplified Algo

Tuesday, June 15, 2021 2:44 PM

for i in 1000

random student

$$\boxed{w_n = w_0 + \eta(y_i - \hat{y}_i)x_i}$$

0

if $x_i \in N$ and $\sum w_i x_i \geq 0$

$$w_n = w_0 - \eta x_i$$

if $x_i \in P$ and $\sum w_i x_i < 0$

$$w_n = w_0 + \eta x_i$$

$$w_n = w_0$$

1

-1

$$w_n = w_0 + \eta x_i$$

$$w_n = w_0 - \eta x_i$$

y_i	$\hat{y}_i$	$y_i - \hat{y}_i$
1	1	0
0	0	0
1	0	1
0	1	-1