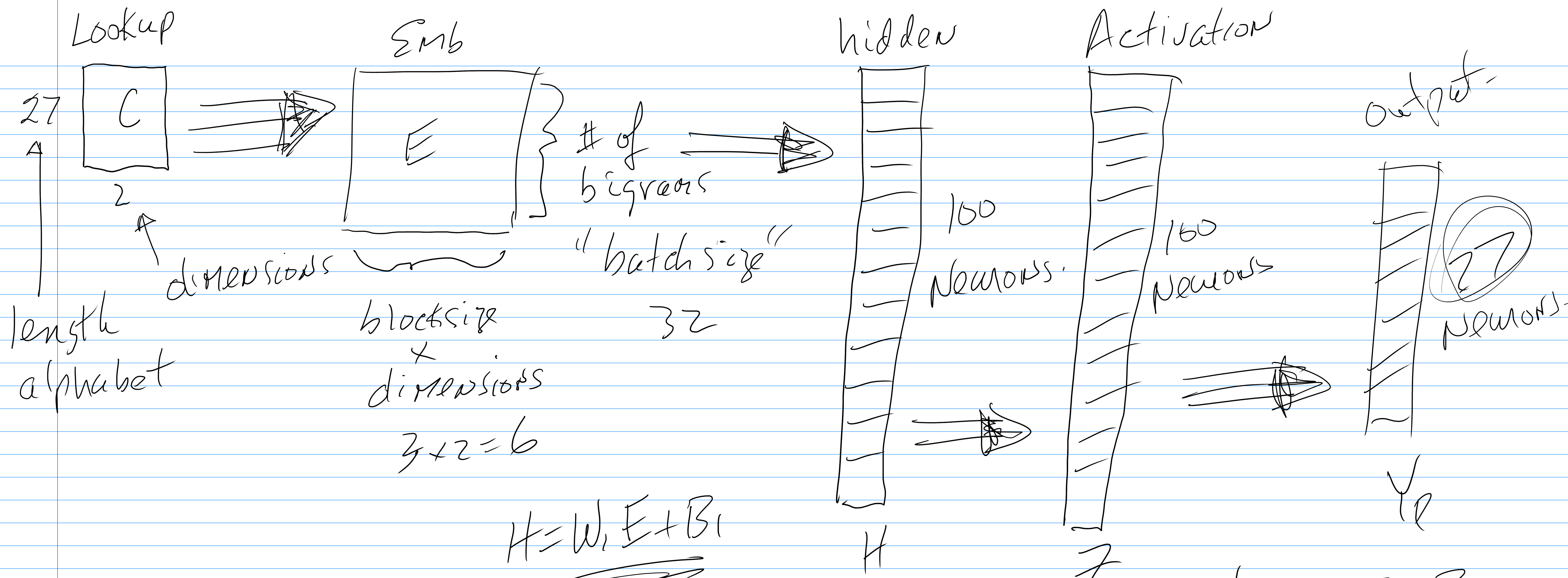


$$H = W_1 E + B_1$$

$$Y_p = W_2 Z + B_2$$

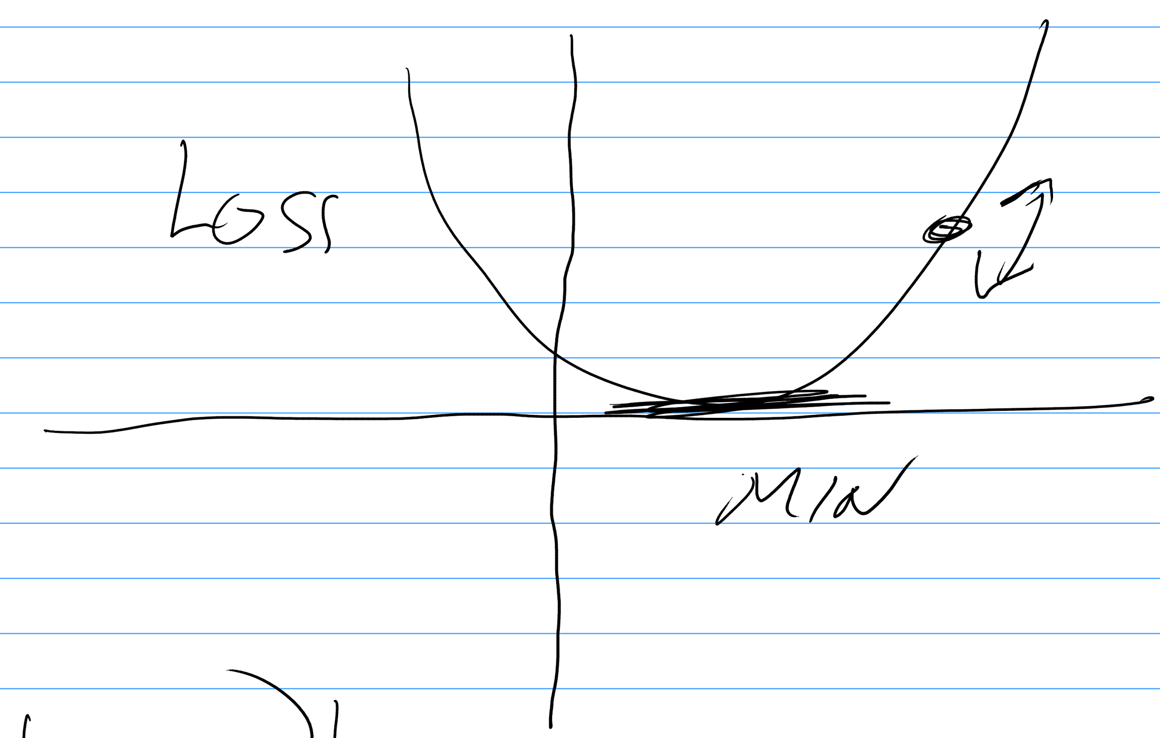
$$Z = \tanh(H)$$

$$\text{Loss} = \frac{1}{2}(Y_p - Y)^2$$

$$= \frac{1}{2}(Y_p - Y)(Y_p - Y)$$

$$= \frac{1}{2}(Y_p^2 - 2YY_p + Y^2)$$

$$\text{Loss} = \boxed{\frac{Y_p^2}{2}} - \boxed{YY_p} + \cancel{\frac{Y^2}{2}}$$



$$\frac{\partial L}{\partial Y_p} = Y_p - Y$$

$$32 \; \boxed{\frac{\partial L}{\partial Y_p} = \sum Y_p - Y}$$

S

$$\frac{\partial L}{\partial C}, \frac{\partial L}{W_1}, \frac{\partial L}{B_1}$$

$$\frac{\partial L}{W_2}, \frac{\partial L}{B_2}$$

deltas

$$\frac{\partial L}{\partial B_2} = \cancel{\boxed{\frac{\partial L}{\partial Y_p}} \cdot \frac{\partial Y_p}{\partial B_2}}$$

chain rule.

$$\frac{\partial L}{\partial W_2} = \frac{\partial L}{\partial Y_p} \left(\frac{\partial Y_p}{\partial W_2} \right)$$

Z

$$Y_p = \cancel{W_2 Z} + B_2$$

$$\frac{\partial Y_p}{\partial B_2} = 1$$

$$\frac{\partial L}{\partial B_2} = \sum Y_p - Y \cdot 1$$

$$\frac{\partial L}{\partial W_2} = \sum Y_p - Y \cdot Z$$

Z after activation

$$\boxed{\frac{\partial L}{\partial B_1}} = \cancel{\frac{\partial L}{\partial Y}} \cdot \cancel{\frac{\partial Y}{\partial Z}} \cdot \cancel{\frac{\partial Z}{\partial H}} \cdot \cancel{\frac{\partial H}{\partial B_1}}$$

1

Act function

$$y = \tanh(x)$$

$\sum \hat{y}_i - y$ $\quad W_2$

$\frac{dy}{dx} = \underline{1-\tanh^2(x)}$

$1 - \tanh(x) * \tanh(x)$

$$\boxed{\frac{\partial L}{\partial W_1}} = \frac{\partial L}{\cancel{\partial \hat{y}}} \cdot \cancel{\frac{\partial \hat{y}}{\partial z}} \cdot \cancel{\frac{\partial z}{\partial H}} \cdot \boxed{\frac{\cancel{\partial H}}{\partial W_1}}$$

E

$H = \underline{E} W_1 + B_1$

$\frac{\partial H}{\partial W_1} = E$

$$\boxed{\frac{\partial L}{\partial E}} = \frac{\partial L}{\cancel{\partial \hat{y}}} \cdot \cancel{\frac{\partial \hat{y}}{\partial z}} \cdot \cancel{\frac{\partial z}{\partial H}} \cdot \frac{\cancel{\partial H}}{\partial E}$$

ΔE $\quad W_1$

$\underline{E = E + \Delta E}$

then is to unembed E into C Lookup table.