$$\frac{\partial}{\partial a}\left(\frac{1}{1+e^{-ax}}\right) = \frac{x e^{-ax}}{(1+e^{-ax})^2} = \left\{ \bar{y} = \frac{1}{1+e^{-ax}} \right\}$$

$$\frac{x e^{-ax}}{(1+e^{-ax})^2} = \bar{y}^2 \cdot x e^{-ax} = \bar{y}^2 \cdot x \cdot \frac{1-\bar{y}}{\bar{y}} = \underline{x \cdot \bar{y}(1-\bar{y})}$$

$$\bar{y}(1+e^{-ax}) = 1$$

$$\bar{y} + \bar{y} e^{-ax} = 1$$

$$e^{-ax} = \frac{1-\bar{y}}{\bar{y}}$$

$$\frac{dQ}{da} = \frac{dQ}{d\bar{y}} \cdot \frac{d\bar{y}}{da} = \frac{dQ}{d\bar{y}} \cdot \frac{d\bar{y}}{dv} \cdot \frac{dv}{da}$$

W domu umieć takie wyrażenia obliczać

$$\text{param} \leftarrow \text{param} - \eta \cdot \frac{\partial Q}{\partial \text{param}}$$

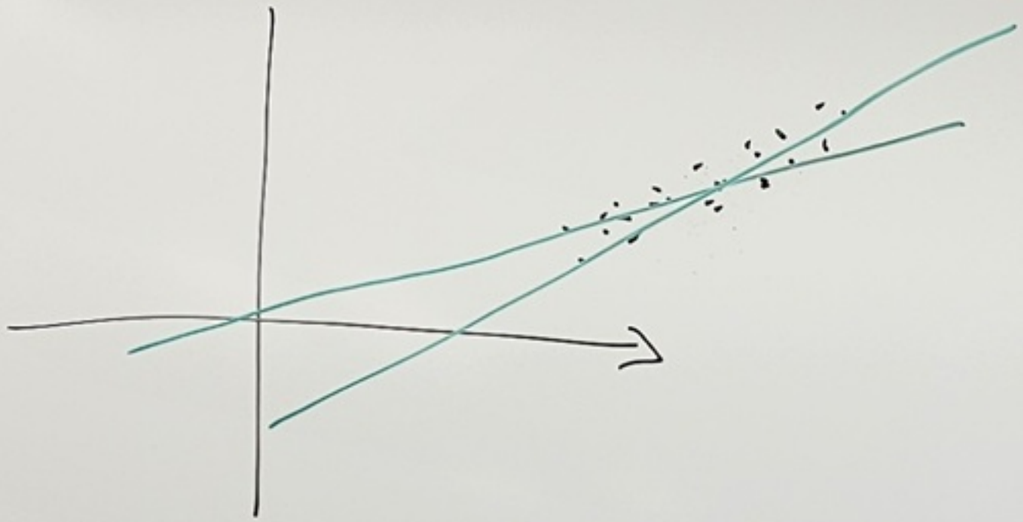
W domu rozszerzyć obliczenia dla wielu wym.:

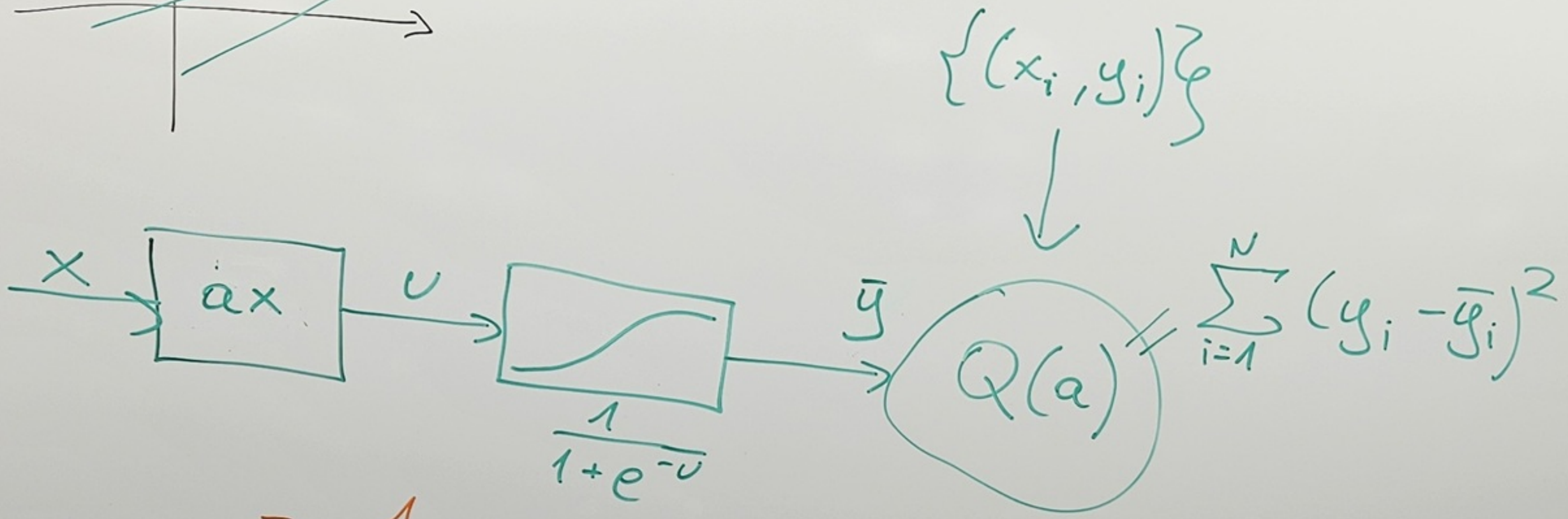
a) $\bar{y} = \frac{1}{1+e^{-v}}$, $v = ax+b$

b) $v = a_1 x^{(1)} + a_2 x^{(2)} + \ldots + a_s x^{(s)} + b$

lr.coef_

lr.intercept_

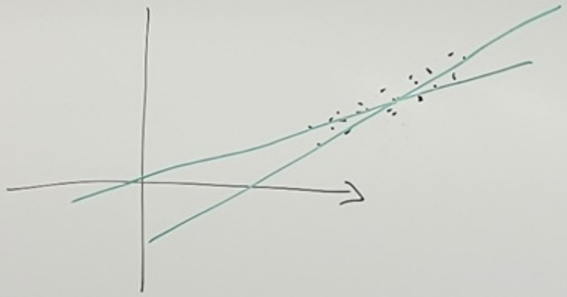




$$\bar{y} = \frac{1}{1+e^{-ax}}$$

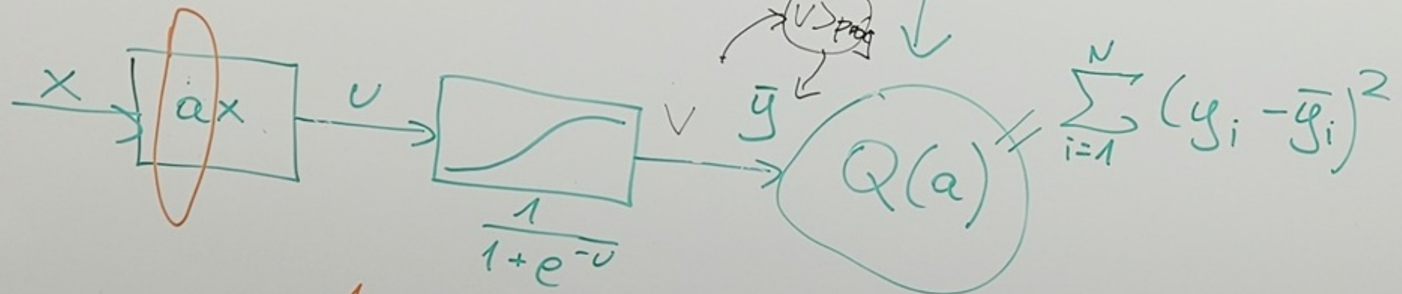
$$\frac{dv}{dx} \leftarrow \cdot \frac{d\bar{y}}{dv} \leftarrow = \frac{dQ}{d\bar{y}} \leftarrow$$

$$-e^{-ax} \cdot (-x)$$



wzrost	płeć
186	0
177	0
162	1
.	.
.	.
.	.

próg $\{(x_i, y_i)\}$



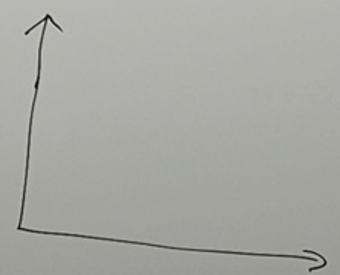
$$\bar{y} = \frac{1}{1+e^{-ax}}$$

$$\frac{dQ}{d\bar{y}} \cdot \frac{d\bar{y}}{du} \cdot \frac{du}{dx}$$

$$-e^{-ax} \cdot (-x)$$

$$\bar{y} = \begin{cases} v \geq 0.5 \rightarrow 1 \\ w\ przec \rightarrow 0 \end{cases}$$

?



prawd. że kob.

$\{x_i\}_{i=1}^{N}$ $x_i \in \{0, 1\}$

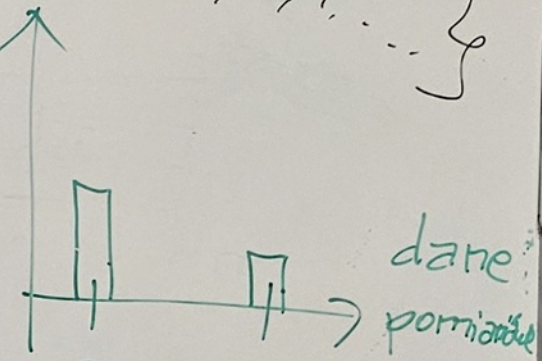
$\{0, 0, 1, 0, 1, 1, 0, 0, 1 \ldots\}$

$p(ile\_1, ile\_0 | \theta) = \theta^{ile\_1} \cdot (1-\theta)^{ile\_0}$

W domu | zaimplementuj generator danych

```
np.random.rand() > θ
np.random.choice(['M', 'K'], p=[θ, 1-θ], size=N)
                  0    1
```

```
def make_data(theta, N)
```



1. θ = ustalam
2. make_data(θ, N)
   {1, 1, 0, 1, 0, 1, 1, 1, 0}
3. ile_0, ile_1
4. $\theta^{ile\_1}(1-\theta)^{ile\_0}$
5. $p(ile\_1, ile\_0)$ — θ - param. procesu gener. dane

par