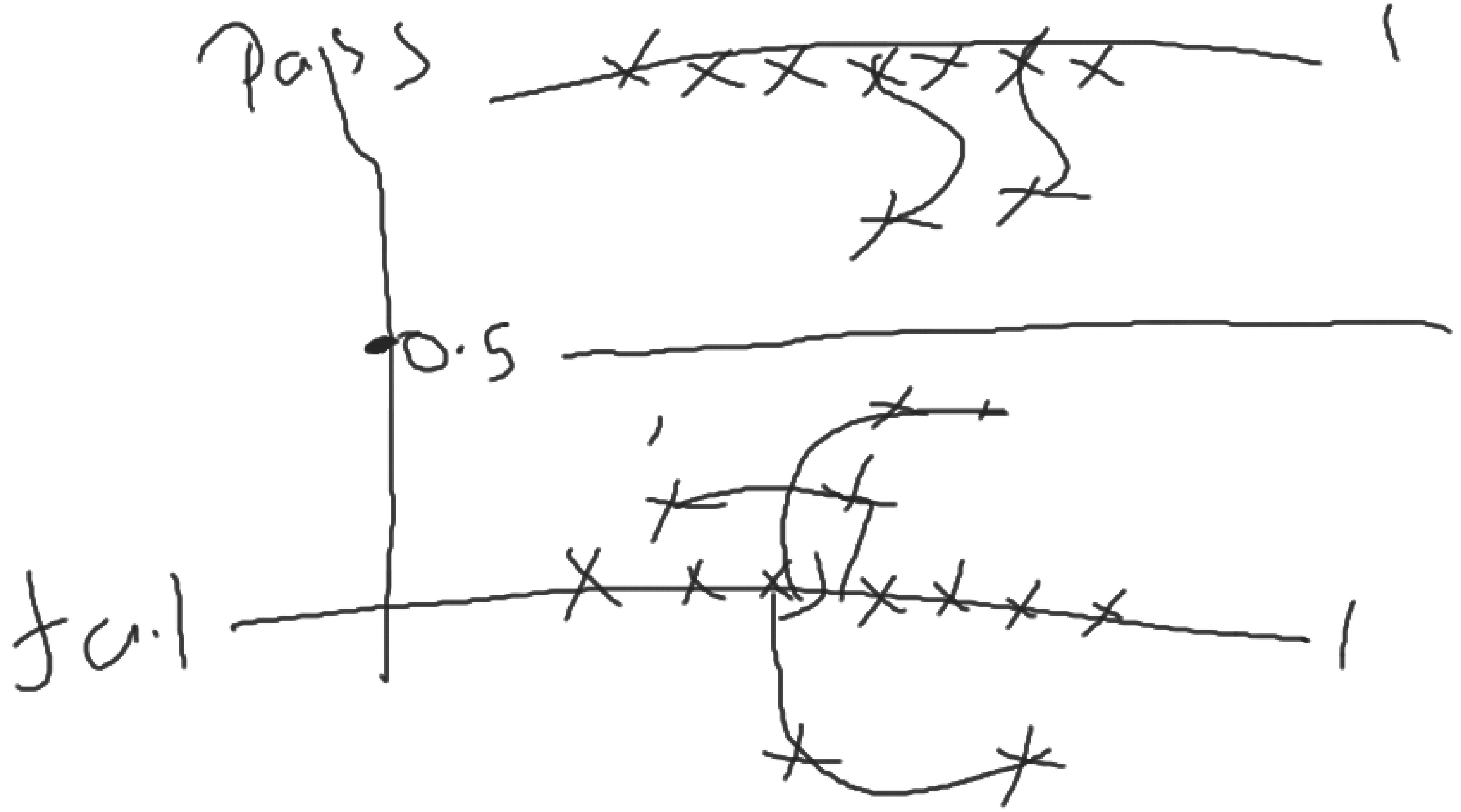
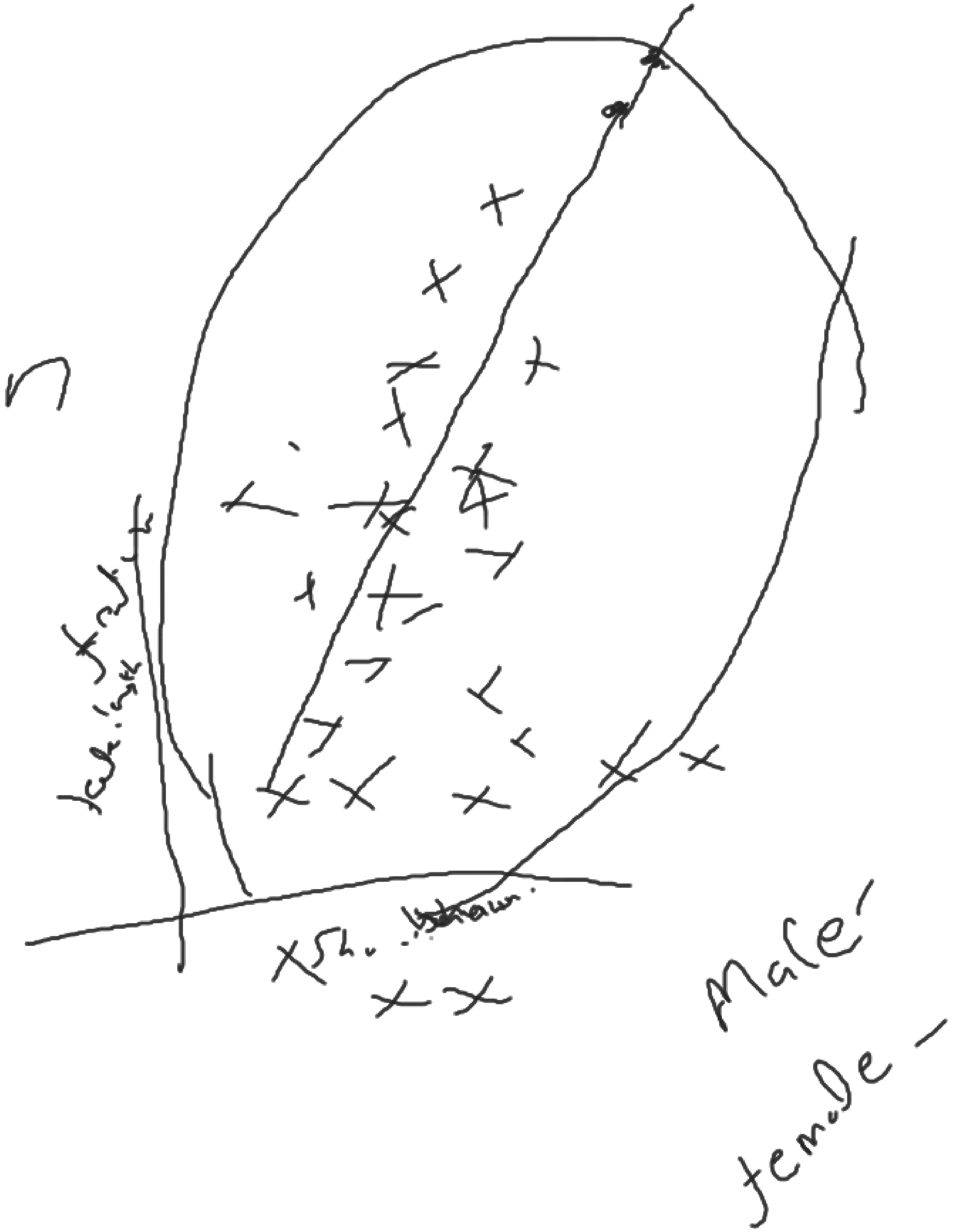
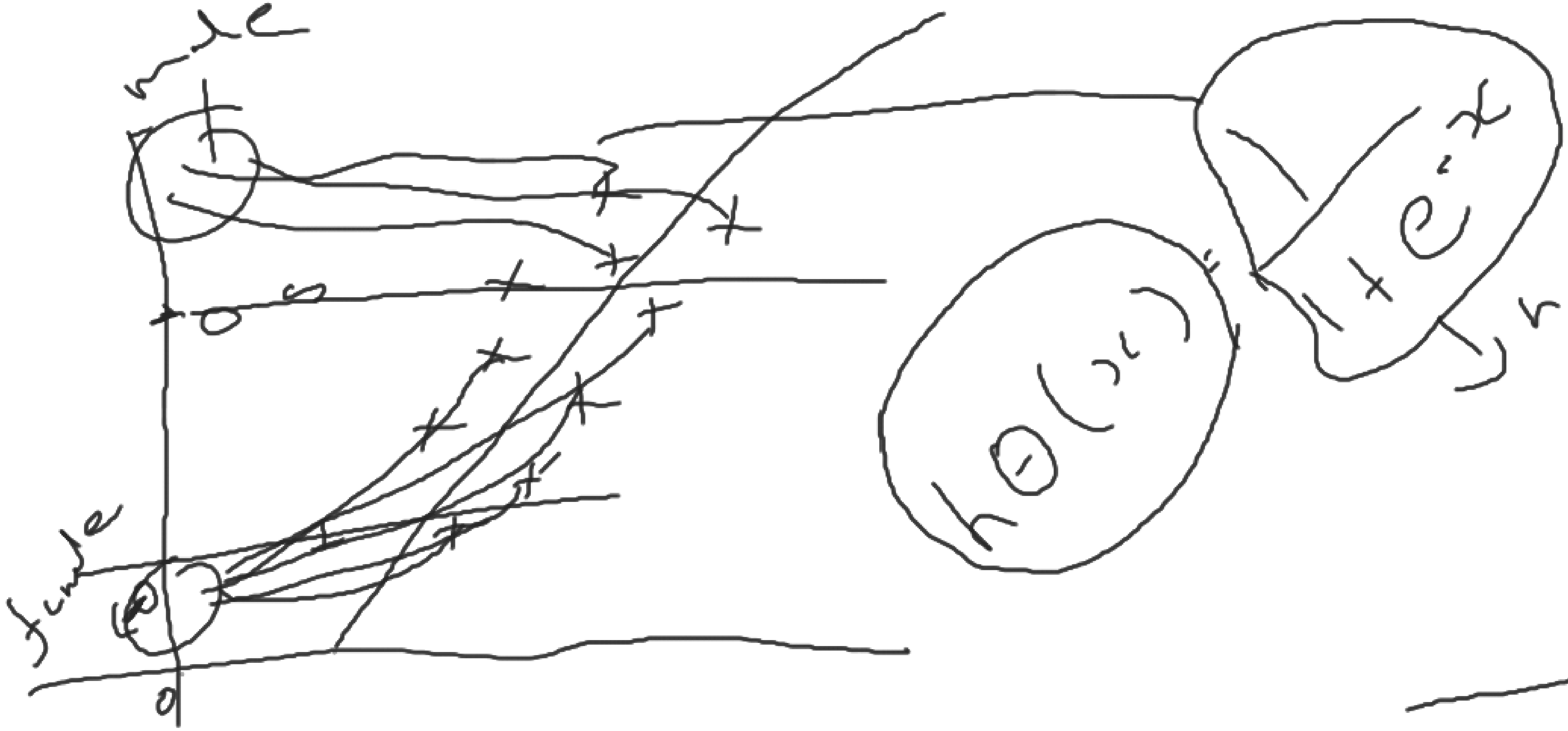
Classfication

Logistic Regression







$$\text{Sigmoid} = \frac{1}{1+e^{-x}}$$

$$h_\theta(x) = \theta^T x$$

Decision Boundry

$$h_\theta(x) = \theta_0 + \theta_1 + \theta_2 + \theta_3 + \ldots,$$

$\underbrace{h_\theta(x)}_{\text{input}}$ → hypothesis

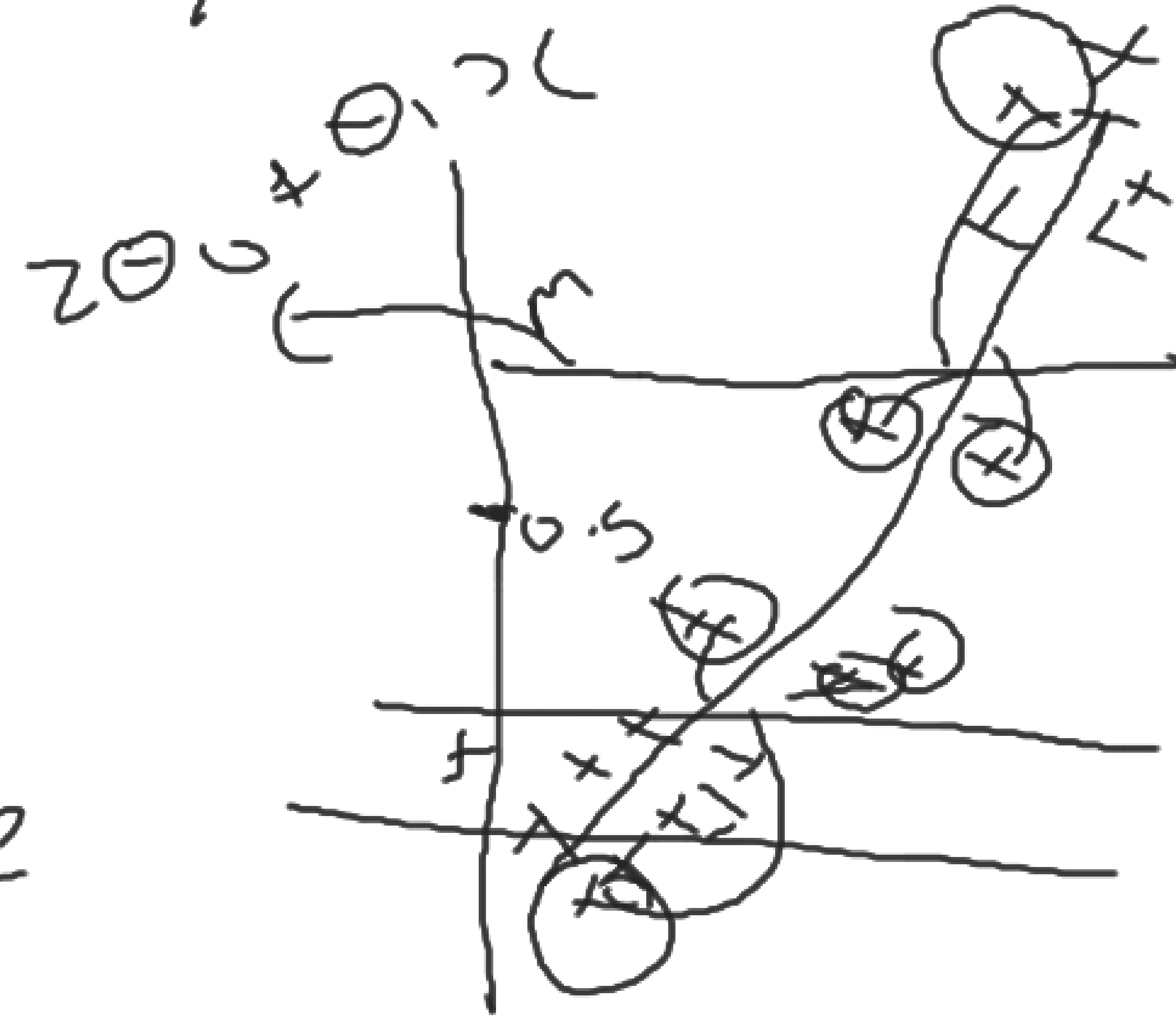
$= g(\theta_0 + \theta_1 x_1)$ → loss function

$z = \theta_0 + \theta_1 x_1$ → male or female

sigmoid $= \dfrac{1}{1+e^{-z}}$

$z = \theta_0 + \theta_1 x_1$

$\theta_0 + \theta_1 x_1$



$g(z) \geq 0.5$ → male

$g(z) < 0.5$ → female

$h_\theta(x^i), y^i$

$h_\theta x = \frac{1}{1+e^{-x}}$

$-\log(h_\theta x^i)$ $y=1$ $\to$ $-\log(1-h_\theta x)$

$0 \to 1$

$-\log(h_\theta x^i) \to y=0 \to$ male

0.5

$0 \to$

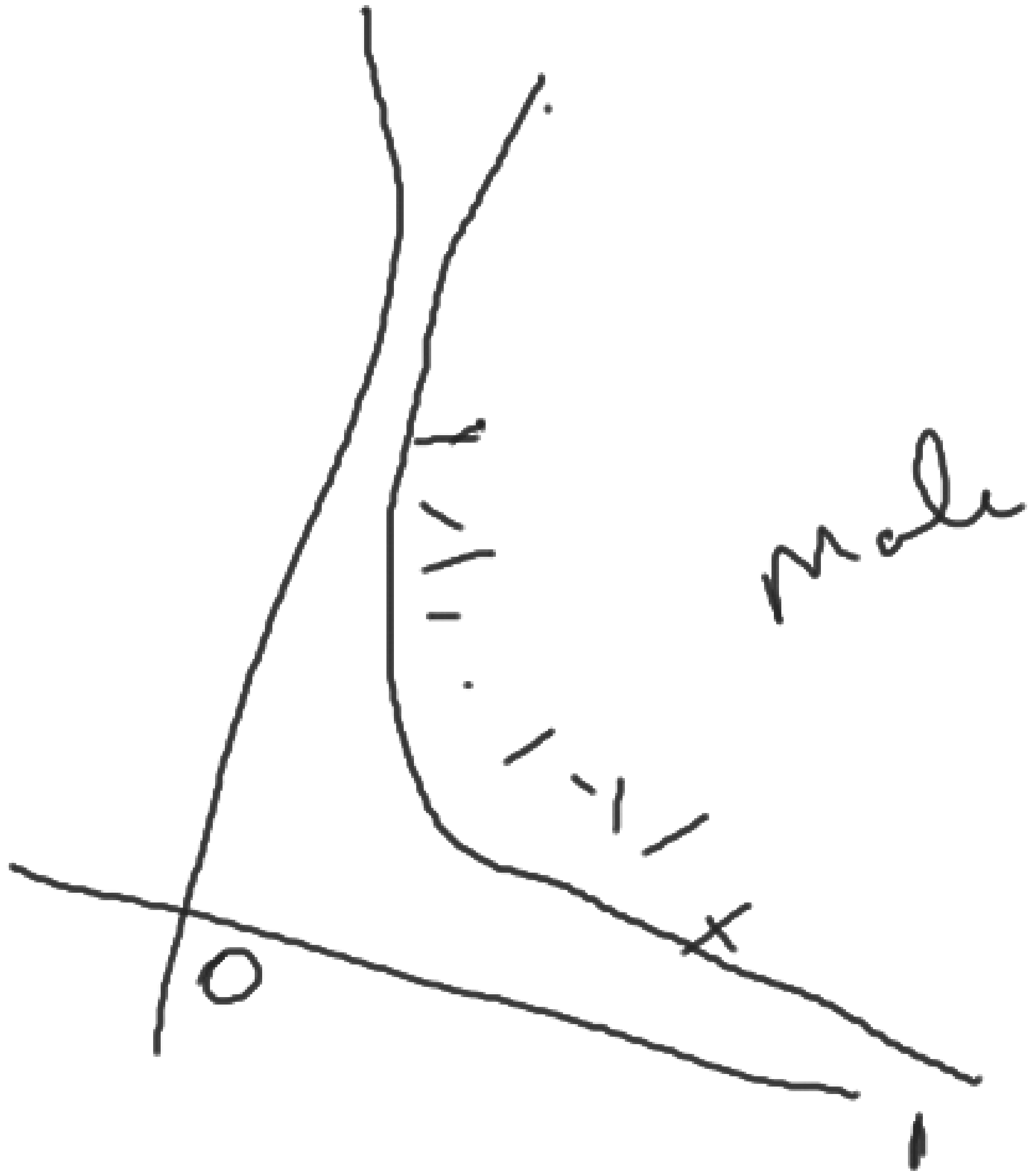
$-\log(1-h_\theta x^i) \to y=0 \to$ female

$0 \quad 0.5 \to 1$

$\frac{1}{1+e^{-x}}$

$= \frac{1}{2m}\sum_{i=1}^{m}(h_\theta x^i + 1-y^i)$

$\log(1-h_\theta(x^i$



TP A B FP

1 0 → Actual

Predict	1	0
1	39	0
0	2	73

FN TN

$$\frac{1}{1+e^{-x}} = h(\theta x)$$

$(h_\theta x_i - y_i)^2$

$(h_\theta x$

$(slope)^2$

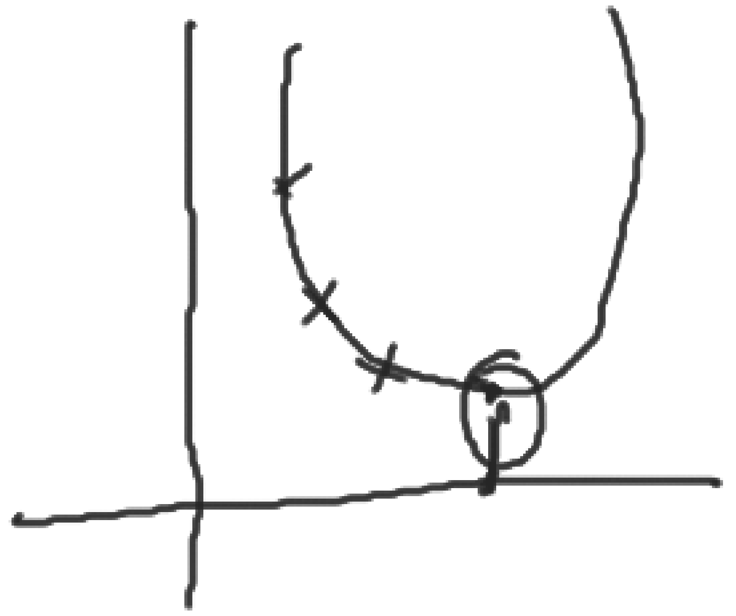
$|slope|$

$(h_\theta x_i - y_i$

$h_\theta x$

Nonconvex

$\frac{1}{1+e^{-x}}$



sigmoid

log

$= \frac{1}{2m} \sum_{i=1}^{m}$

$\Sigma W_{i=1}$

= log

$\frac{1}{2m}$

$\frac{1}{1+e^{-x}}$