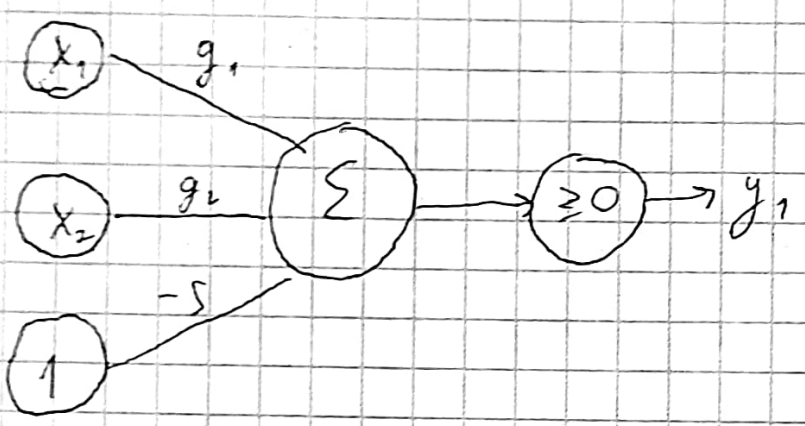
Exersize sheet 3 Task 1a)

Perceptron with three inputs and one output




As stated in the task, current state of perceptron: $g=(\frac{1}{2};\frac{1}{2})$, $S=\frac{1}{2}$, $\eta=\frac{1}{2}$, $x_t=(1,0)$, $S_t=1$

Calculation of next training iteration:

$w=(g_1,g_2,-S)^T=(\frac{1}{2},\frac{1}{2},-\frac{1}{2})^T$

$x_t^0=(x_1,x_2,1)^T=(1,0,1)^T$

1.) $w^T\cdot x_t^0=\frac{1}{2}\cdot 1+\frac{1}{2}\cdot 0-\frac{1}{2}\cdot 1=0 \Rightarrow y_t=1$

$d_t=(S_t-y_t)^2=(-1-1)^2=4$

$w'=w+\eta(S_t-y_t)x_t=[\frac{1}{2}+\frac{1}{2}\cdot(-2)\cdot 1,\ \frac{1}{2}+0,\ -\frac{1}{2}+\frac{1}{2}(-2)\cdot 1]^T=$

$=(-\frac{1}{2},0,-\frac{3}{2})^T \Rightarrow S=\frac{3}{2}$

$g=(-\frac{1}{2},0)^T$

$w^T\cdot x_t^0=-\frac{1}{2}\cdot 1+\frac{1}{2}\cdot 0-\frac{3}{2}\cdot 1=-2<0 \Rightarrow y_t'=-1 \Rightarrow d_t'=0$

model trained.