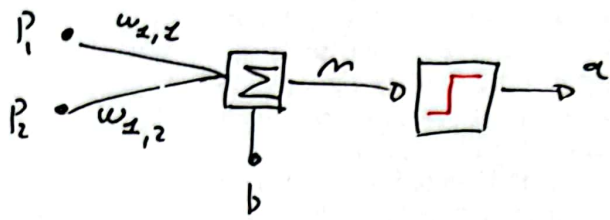


5/ $p_1 = \begin{bmatrix} 2 \\ 2 \end{bmatrix} \quad t_1 = 0 \quad p_2 = \begin{bmatrix} 1 \\ -2 \end{bmatrix} \quad t_2 = 1 \quad p_3 = \begin{bmatrix} -2 \\ 2 \end{bmatrix} \quad t_3 = 0 \quad p_4 = \begin{bmatrix} -1 \\ 1 \end{bmatrix} \quad t_4 = 1$

$w(0) = \begin{bmatrix} 0 & 0 \end{bmatrix}$
 $b(0) = 0$

Hard Lim $a = 0 \quad m < 0$
 $a = 1 \quad m \geq 0$



$t=1$
 $a = \text{hard lim} (2 \cdot 0 + 2 \cdot 0 + 0) = \text{hard lim}(0) = 1$

$$e(1) = (t(1) - a(1)) = (0 - 1) = -1$$

$$w(k+1) = w(k) - p(k)$$

$$w(2) = \begin{bmatrix} 0-2 & 0-2 \end{bmatrix}$$

$$w(2) = \begin{bmatrix} -2 & -2 \end{bmatrix}$$

$t=2$
 $a = \text{hard lim} (1 \cdot -2 + -2 \cdot -2 + 0) = \text{hard lim}(2) = 1$

$$e(2) = (t(2) - a(2)) = (1 - 1) = 0 \quad \& \quad w(k+1) = w(k)$$

$t=3$
 $a = \text{hard lim} (-2 \cdot -2 + 2 \cdot -2 + 0) = \text{hard lim}(0) = 1$

$$e(3) = (t(3) - a(3)) = (0 - 1) = -1$$

$$w(k+1) = w(k) - p(k)$$

$$w(4) = w(3) - p(3)$$

$$w(4) = \begin{bmatrix} -2-2 & -2-2 \end{bmatrix}$$

$$w(4) = \begin{bmatrix} 0 & -4 \end{bmatrix}$$

$T=4$
 $a = \text{hard lim} (-1 \cdot 0 + 1 \cdot -4 + 0) = \text{hard lim}(-4) = 0$

$$e(4) = (t(4) - a(4)) = (1 - 0) = 1$$

$$w(5) = w(4) + p(4)$$

$$w(5) = \begin{bmatrix} -1 & -3 \end{bmatrix}$$

$$T=5$$

$$a = \text{hard lim}(2 \cdot -1 + 2 \cdot -3 + 0) = \text{hard lim}(-8) = 0$$

$$e(5) = (t(5) - a(5)) = 0 - 0 = 0$$

$$T=6$$

$$a = \text{hard lim}(1 \cdot -2 + -2 \cdot -3 + 0) = \text{hard lim}(-7) = 0$$

$$e(6) = (t(6) - a(6)) = 1 - 0 = \underline{1}$$

$$\omega(7) = \omega(6) + P(1)$$

$$\omega(7) = [0 \quad -5]$$

$$T=7$$

$$a = \text{hard lim}(-2 \cdot 0 + 2 \cdot -5 + 0) = \text{hard lim}(-10) = 0$$

$$e(7) = (t(7) - a(7)) = 0 - 0 = 0$$

$$T=8$$

$$a = \text{hard lim}(-1 \cdot 0 + 1 \cdot -5 + 0) = \text{hard lim}(-5) = 0$$

$$e(8) = (t(8) - a(8)) = 1 - 0 = \underline{1}$$

$$\omega(9) = \omega(8) + P(8)$$

$$\omega(9) = [-1 \quad -4]$$

$$T=9$$

$$a = \text{hard lim}(2 \cdot -1 + 2 \cdot -4 + 0) = \text{hard lim}(-10) = 0$$

$$e(9) = (t(9) - a(9)) = (0 - 0) = 0$$

$$T=10$$

$$a = \text{hard lim}(1 \cdot -1 + -2 \cdot -4 + 0) = \text{hard lim}(7) = 1$$

$$e(10) = (t(10) - a(10)) = (1 - 1) = 0$$

$$T=11$$

$$a = \text{hard lim}(-2 \cdot -1 + 2 \cdot -4 + 0) = \text{hard lim}(-6) = 0$$

$$e(11) = (t(11) - a(11)) = (0 - 0) = 0$$

$$T=12$$

$$a = \text{hard lim}(-1 \cdot -1 + 1 \cdot -4 + 0) = \text{hard lim}(-3) = 0$$

$$e(12) = (t(12) - a(12)) = (1 - 0) = \underline{1}$$

$$\omega(13) = [-2 \quad -3]$$

$$T=13$$

$$a = \text{hard lim} (2 \cdot -2 + 2 \cdot -3 + 0) = \text{hard lim} (-10) = 0$$

$$e(13) = (t(13) - a(13)) = (0 - 0) = 0$$

$$T=14$$

$$a = \text{hard lim} (1 \cdot -2 + -2 \cdot -3 + 0) = \text{hard lim} (4) = 1$$

$$e(14) = (t(14) - a(14)) = (1 - 1) = 0$$

$$T=15$$

$$a = \text{hard lim} (-2 \cdot -2 + 2 \cdot -3 + 0) = \text{hard lim} (-2) = 0$$

$$e(15) = (t(15) - a(15)) = (0 - 0) = 0$$

$$T=16$$

$$a = \text{hard lim} (-1 \cdot -2 + 1 \cdot -3 + 0) = \text{hard lim} (-1) = 0$$

$$e(16) = (t(16) - a(16)) = (1 - 0) = 1$$

$$\omega(17) = [-3 \quad -2]$$

$$T=17$$

$$a = \text{hard lim} (2 \cdot -3 + 2 \cdot -2 + 0) = \text{hard lim} (-10) = 0$$

$$e(17) = 0$$

$$T=18$$

$$a = \text{hard lim} (1 \cdot -3 + -2 \cdot -2 + 0) = \text{hard lim} (1) = 1$$

$$e(18) = 0$$

$$T=19$$

$$a = \text{hard lim} (-2 \cdot -3 + 2 \cdot -2 + 0) = \text{hard lim} (2) = 1$$

$$e(19) = -1$$

$$\omega(20) = [-1 \quad -4]$$

$$T=20$$

$$a = \text{hard lim} (-1 \cdot -1 + 1 \cdot -4 + 0) = \text{hard lim} (-3) = 0$$

$$e(20) = (1 - 0) = 1$$

$$\omega(21) = [-2 \quad -3]$$

$$T=21$$

$$a = \text{hard lim} (2 \cdot -2 + 2 \cdot -3 + 0) = \text{hard lim} (-10) = 0$$

$$e(21) = 0$$

$$T=22$$

$$a = \text{hard lim} (1 \cdot -2 + -2 \cdot -3 + 0) = \text{hard lim} (4) = 1$$

$$e(22) = 1$$

$$\omega(23) = [-1 \quad -5]$$

$$T=23$$

$$a = \text{hard lim}(-2 \cdot -1 + 2 \cdot -5 + 0) = \text{hard lim}(-9) = 0$$

$$e(23) = 0$$

$$T=24$$

$$a = \text{hard lim}(-1 \cdot -1 + 1 \cdot -5 + 0) = \text{hard lim}(-4) = 0$$

$$e(24) = 1 - 0 = 1$$

$$w(25) = [-2 \quad -4]$$

$$T=25$$

$$a = \text{hard lim}(2 \cdot -2 + 2 \cdot -4 + 0) = \text{hard lim}(-12) = 0$$

$$e(25) = 0$$

$$T=26$$

$$a = \text{hard lim}(1 \cdot -2 + -2 \cdot -4 + 0) = \text{hard lim}(6) = 1$$

$$e(26) = 0$$

$$T=27$$

$$a = \text{hard lim}(-2 \cdot -2 + 2 \cdot -4 + 0) = \text{hard lim}(-4) = 0$$

$$e(27) = 0$$

$$T=28$$

$$a = \text{hard lim}(-1 \cdot -2 + 1 \cdot -4 + 0) = \text{hard lim}(-2) = 0$$

$$e(28) = 1 - 0 = 1$$

$$w(29) = [-3 \quad -3]$$

$$T=29$$

$$a = \text{hard lim}(2 \cdot -3 + 1 \cdot -3 + 0) = \text{hard lim}(-12) = 0$$

$$e(29) = 0$$

$$T=30$$

$$a = \text{hard lim}(1 \cdot -3 + -2 \cdot -3 + 0) = \text{hard lim}(3) = 1$$

$$e(30) = 0$$

$$T=31$$

$$a = \text{hard lim}(-2 \cdot -3 + 2 \cdot -3 + 0) = \text{hard lim}(0) = 1$$

$$e(31) = 0 - 1 = -1$$

$$w(32) = [-3 - 2 \quad -3 - 2]$$

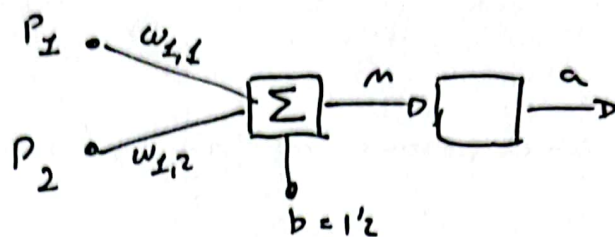
$$w(32) = [-1 \quad -5]$$


No \exists solution, se va repeti endo

$$2) \quad b = 1.2$$

$$W = \begin{bmatrix} 3 & 2 \end{bmatrix}$$

$$P = \begin{bmatrix} -5 & 6 \end{bmatrix}^T$$




2.1/ symmetrical hard limit transfer function 

$$a = \text{hardlim}(n) = \text{hardlim}(P_1 \cdot w_{1,1} + P_2 \cdot w_{1,2} + b) =$$

$$= \text{hardlim}(-5 \cdot 3 + 6 \cdot 2 + 1.2) =$$

$$= \text{hardlim}(-1.8) = 0$$

2.2/ saturating linear transfer function 

$$a = \text{saturlin}(n) = \text{saturlin}(-1.8) = 0$$

2.3/ tansig function 

$$a = \text{tansig}(n) = \text{tansig}(-1.8) = -0.9468$$

$$6/ \omega_{1,1} = 2$$

$$\omega_{1,2} = -1$$

$$\omega_{1,3} = 3$$

$$y(k) = \{5, -4, 0, 0, 0, 0\}$$

$$y(-1) = y(-2) = y(-3) = 0$$

$$\underline{k=0}$$

$$a(0) = \text{pure lim} (5 \cdot 2 + 0 \cdot -1 + 0 \cdot 3) = \text{pure lim} (10) = 10$$

\Downarrow

$$y(-1) = 5$$

$$y(-2) = 0$$

$$y(-3) = 0$$

\Downarrow

$$\underline{k=1}$$

$$a(1) = \text{pure lim} (-4 \cdot 2 + 5 \cdot -1 + 0 \cdot 3) = \text{pure lim} (-13) = -13$$

$$y(-1) = -4$$

$$y(-2) = 5$$

$$y(-3) = 0$$

$$\underline{k=2}$$

$$a(2) = \text{pure lim} (0 \cdot 2 + -4 \cdot -1 + 5 \cdot 3) = \text{pure lim} (17) = 17$$

$$y(-1) = 0$$

$$y(-2) = -4$$

$$y(-3) = 5$$

$$\underline{k=3}$$

$$a(3) = \text{pure lim} (0 \cdot 2 + 0 \cdot -1 + -4 \cdot 3) = \text{pure lim} (-12) = -12$$

$$\underline{k=4}$$

$$a(4) = \text{pure lim} (0 \cdot 2 + 0 \cdot -1 + 0 \cdot 3) = \text{pure lim} (0) = 0$$

$$\underline{k=5}$$

$$a(5) = \text{pure lim} (0 \cdot 2 + 0 \cdot -1 + 0 \cdot 3) = \text{pure lim} (0) = 0$$

$x(0)$ hasta $k=2$, des pues ya no afecta