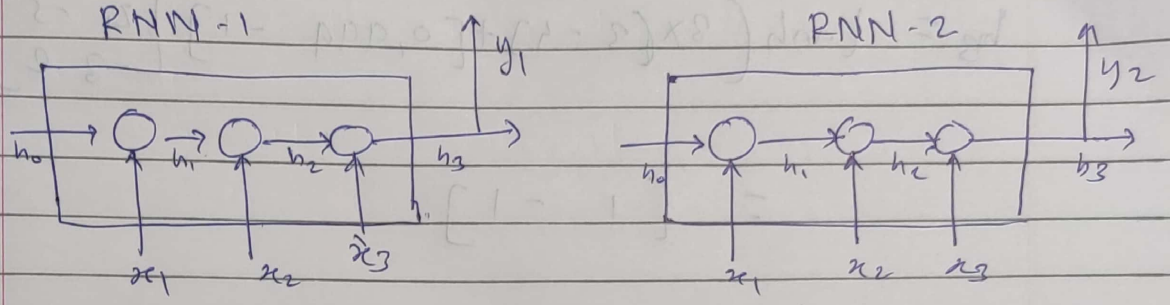
Assignment 5.1

que-1 Estimate the value of yhat for the below network



Number of RNN units = 2

$W_x = [3 \ -4]$ $\quad b_h = 0$

$W_h = \begin{bmatrix} 4 & -5 \\ -3 & 2 \end{bmatrix}$ $\quad b_y = 10$

$W_y = \begin{bmatrix} -4 \\ 2 \end{bmatrix}$ $\quad h_0 = [0 \ \ 0]$

$x_1 = 1, \ x_2 = 2 \ \ x_3 = 3$

$$h_t = \tanh(W_x \cdot x_t + W_h \cdot h_{t-1} + b_h)$$

$$h_1 = \tanh(1 \times [3 \ -4] + 0 + 0)$$

$$= [0.99505 \ \ -0.99932]$$

$$h_2 = \tanh\left(2 \times [3 \ -4] + [0.99505 \ -0.99932] \begin{bmatrix} 4 & -5 \\ -3 & 2 \end{bmatrix} + 0\right)$$

$$= [0.999 \quad -1]$$

$$h_3 = \tanh\left(3 \times [3 \quad -4] + [0.999 \quad -1] \begin{bmatrix} 4 & -5 \\ -3 & 2 \end{bmatrix} + 0\right)$$

$$= [1 \quad -1]$$

$$\hat{y}_t = w_y \cdot h_t + b_y$$

$$\hat{y}_t = w_y \cdot h_3 + b_y$$

$$= [1 \quad -1] \begin{bmatrix} -4 \\ 2 \end{bmatrix} + 10$$

$$= -6 + 10$$

$$\boxed{\hat{y}_t = 4}$$