# [Quiz] Feedback Neural Network (a.k.a., Recurrent Neural Network)

Number: 1
Group:
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Suppose that we have a sequence of eight bits: $XXXXXXXX$, where $X \in \{0, 1\}$. Then,

$$\hat{y} = \sum_{t=1}^{T} x_t$$

where and $T = 8$.
Observe the following facts:

- If $\forall t, x_t = 0$, then $\hat{y} = 0$.
- The desired output is linear with respect to the input, the activation function is designed to be the identity function.
- Use Elman RNN with one hidden neuron as you did for the corresponding homework.

1. **(1 point)** Find the expression for $\frac{\partial E}{\partial v_x}$, where $E$ is the sum of squared error function between the estimated output ($\hat{y}$) and the actual output ($y$), and $v_x$ is the parameter that relates the hidden state at time $t$ and the input at time $t$.

2. **(1 point)** Give the mathematical expression for the forward propagation corresponding to the above problem.