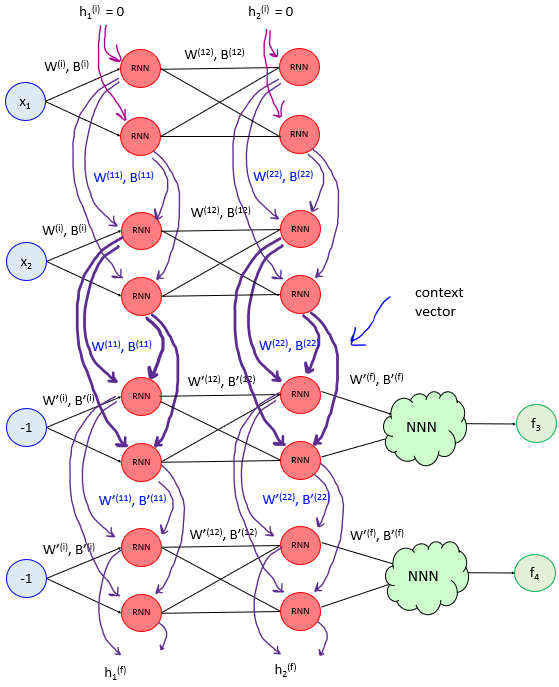
**Neural Networks – Simple Encoder/Decoder**

Now want to discuss sequence to sequence modeling, or seq2seq. This pertains to the situation where we want to predict more than just the next term in a sequence, but the next however-many terms. Generally this is done via an encoder-decoder architecture. At the most basic level, this can be achieved by attaching two different recurrent neural network together. The top one is the encoder neural network. In the illustration it takes as input x1 and x2, and encodes the sequence within the hidden state (h1, h2). This hidden state emerging from the encoder, in bold, also called the context vector, gets fed into the decoder recurrent neural network as its initial hidden state. The decoder recurrent neural network takes as input dummy variables, say -1. The number of dummy variables is equal to the number of terms in the sequence that you want to predict. The decoder has its own set of recurrent weights and biases (distinguished from the encoder set by primes). And ultimately, its output is fed into a neural network to produce the final predictive output of the sequence terms. Note the weights and biases in the normal neural network (NNN) are the same for all output time steps.



There are other versions. Instead of dummy variables being fed into the output, one may feed the entire context vector into each of the inputs instead, and set the initial hidden state of the decoder to 0.