MCB128

Quiz b2

October 9, 2026

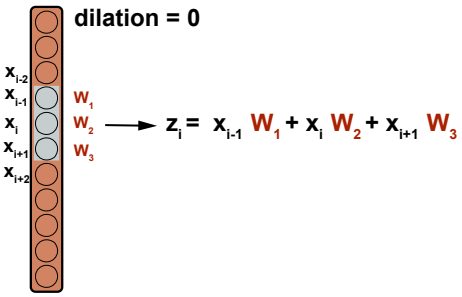
Name: _____ **Score:** _____

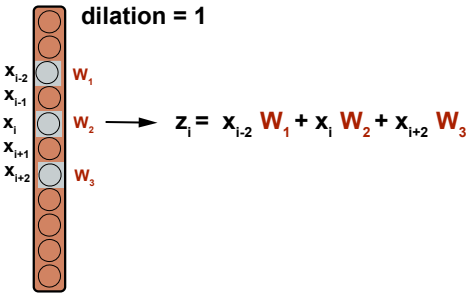
Instructions:

- Show all work for full credit.
- Can check notes; no prompts to chatbot allowed

---

1. (**2 pts**) Write the equation of a 1D convolution with a kernel of size 3 $W = (w_1, w_2, w_3)$, and a dilation of 0 and 1 respectively.





2. (**2 pts**) For a CNN output layer with dimenstion $[L, C_O]$, what would be the size of the layer after pooling with size of $L/4$? Which PyTorch function would you use (including arguments)?

   The size after pooling is $[4, C_O]$.

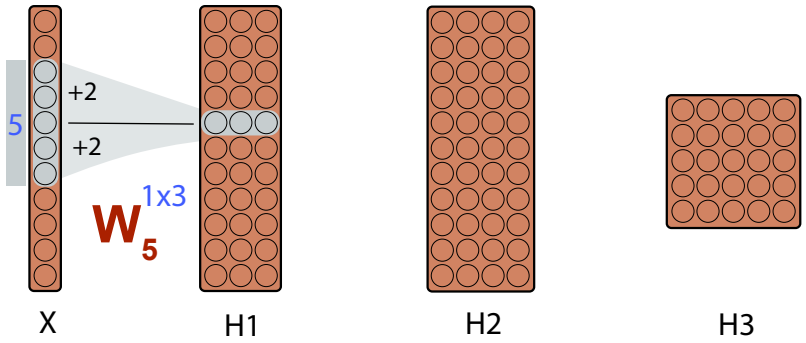
   `nn.MaxPool1d(kernel_size = L/4)`

3. (**2 pts**) For a vanilla RNN, count the number of parameters for an input size D, a hidden dimension H. Assume there are biases. Ignore the output layer.

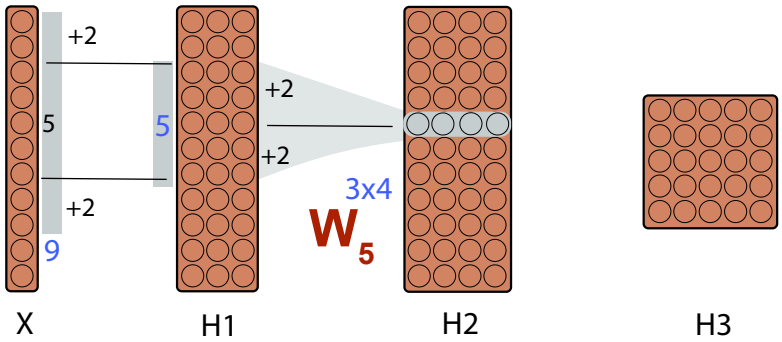
$$D \times H + H \times H + H = (D + H + 1)H.$$

4. (**4 pts**) A network consists of three 1D convolutional layers. At each layer, a zero-padded convolution with kernel size 5, stride 1, and dilation 0 is applied.

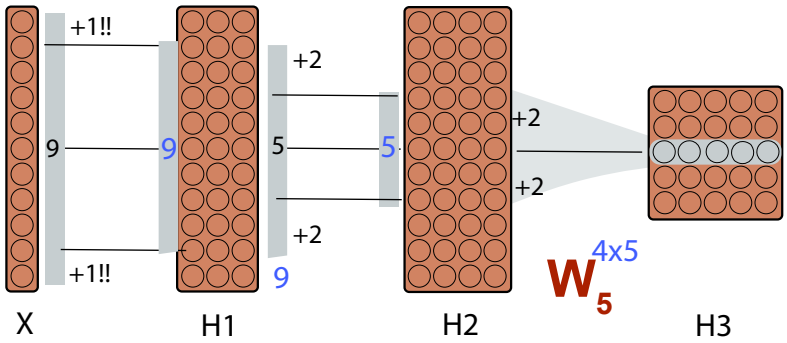
   (a) What size is the receptive field of hidden units in the first, second and third layers?



H_1 receptive field = 1+4 = 5



H_2 receptive field = 5+4 = 9



H_3 receptive field = 9+2 = 11 (both correct answers)

H_3 receptive field = 9+4 = 13 (with padding)

adapted from: UDL, Prince

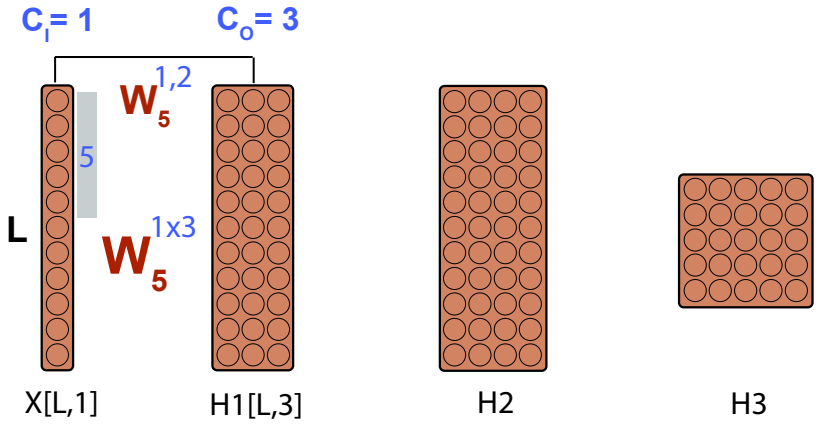
(b) How many W_5 kernels for the $X \to H_1$, $H_1 \to H_2$, and $H_2 \to H_3$ convolutions respectively?

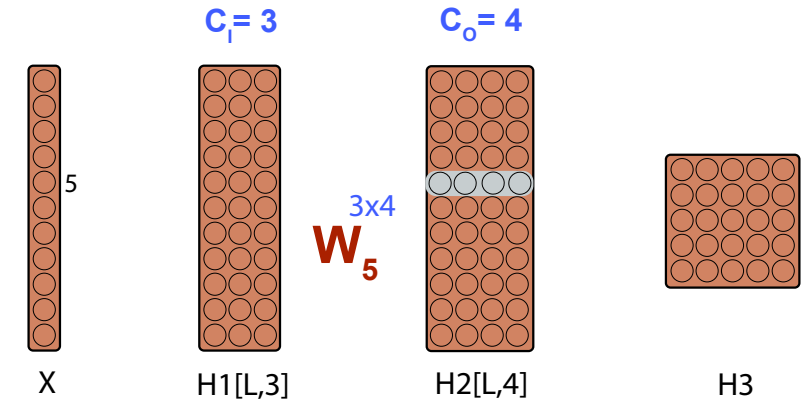
CNN Kernels

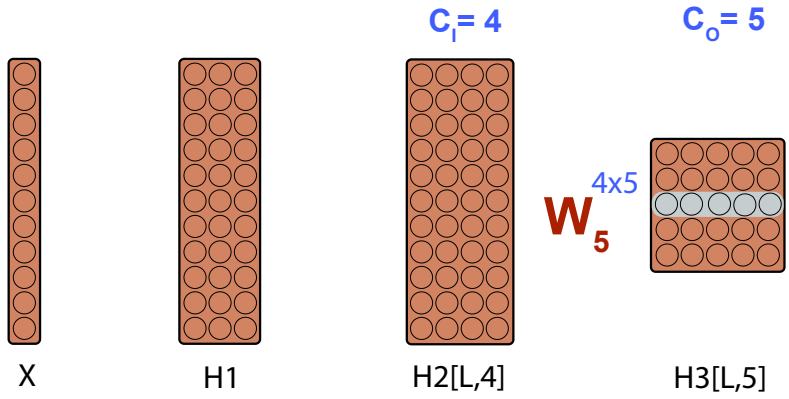
C_I = # input layer channels
C_O = # output layer channels

$W[5, C_I, C_O]$

$W_5^{C_I \times C_O}$







adapted from: UDL, Prince