Q1

Consider the following problem. There is a sequence of words representing positive integers, e.g.

```
["three", "one", "four", "one", "five", "two", "five", "three", "five"]
```

and we want to know, for each token, the central moving average of the associated numbers, with a window size of 3. That is, $f(x_i) = \frac{x_{i-1}+x_i+x_{i+1}}{3}$. The result for the above example should be $[4/3, 8/3, 2, 10/3, 8/3, 4, 10/3, 13/3, 8/3]$.

Construct, manually, a bidirectional RNN structure and associated weights that will solve this problem. This should be in the form of a flowchart identifying inputs and outputs, weights, sums, and activation functions, along with any necessary auxiliary text. You may use *only* weights, sums, and scalar activation functions. Assume that the vocabulary is encoded as:

```
{
    "five":  [1,0,0,0,0],
    "four":  [0,1,0,0,0],
    "one":   [0,0,1,0,0],
    "three": [0,0,0,1,0],
    "two":   [0,0,0,0,1],
}
```

Note that for your bidirectional RNN, you should specify the form of the forward cell, the backward cell, and the output (non-recurrent) cell.

You may work in a group of 1 or 2. Submissions will be graded without regard for the group size. You should turn in a document (`.txt`, `.md`, or `.pdf`) answering all of the red items above. You should also turn in Python scripts (`.py`) for *each* of the blue items.