Matthew O'Brien
CS445
Homework1

The accuracy for my program ranged from about 70 to 75 percent depending on the trial. I ran it multiple times out of curiosity to see what would happen, and the average accuracy I got out of a few different trials was roughly 73%. Rather than including multiple confusion matrices, I will just have the one I included in my files. My output from that is a 26 by 26 two dimension array. It is not the prettiest of formats, but each indices of the array corresponds to a letter. The first being A, the second B, 3 is equal to C. The rows going down are the expected letter value, and the columns across are the perceptron outputs, just as the slides show. The corresponding numbers in the matrix are the amount of times that occurred in the program. So for the first position of 1,1: The program actually saw A and guessed an A 352 times. But it also saw an A and guessed a C 4 times for position 1, 3. I will include a copy and pasted version of the matrix into this document as well, but the plain text file included shows it in a much cleaner format. The program did a decent job noticing the letter, and I would be very interested to see what could've happened if I had more data to feed it. The next page will have the copy and pasted version of the matrix. But again, I suggest viewing it in the plain text file as well, simply because it was formatted for that and not a word/pdf document.

```
[[352   0   4   1   0   0   2   1   1   2   0   3  19   2   8   0  10   7   4   0   6   0   1   0   0   1]
 [  2 330   0  26  10  15  10  18   6   1   5   3   4   3   0   4  11  74  42   2   0   4   0   2   0   0]
 [  0   0 279   0  26  11 127   5   1   0   9  12   0   0  16   0   1   0   1   2  40   0   0   2   0   0]
 [  3   8   1 351   0   9  13  16   7  12  10  17   0   9  30  19   5   6   1   1   4   0   0  16   4   0]
 [  0   2  27   1 285   2  11   3   4   7   7  15   0   0   0   1   6   1  35   7   0   0   0  25   0  14]
 [  0   1   1   1   2 315   3   8  13  19   0   0   0   0   0  77   0   0  33  19   0   4   3   6  39  14]
 [  1   0   9   0   5   0 120   8   0   0  28   8   0   0  10   5   9   4  19   3   0   2   1  24   0   0]
 [  4   1   1  12   0   3   3 207   0   4  12   1   3  49  43   1   3  15   0   1   8   0   3   6   3   1]
 [  0  12   0   0   4   3   0   0 331  70   0   5   0   0   0   0   0   1  33   1   0   0   0  39   0   1]
 [  7   0   0   3   0   0   0   5   6 221   1   0   0   0   3   4  13   4   3   0   0   1   0  22   1  41]
 [  2   0  21   0   3   0   4   5   1   0 253   3   0   2   0   1   0  17   0   6   4   0   0   6   0   0]
 [  0   0   0   1   0   0   2   0   3   0   0 298   0   0   0   0   1   0  10   0   0   0   0  22   0   2]
 [  0   0   2   2   0   0   2   1   0   0   0   0 322  12   1   0   0   0   0   0   6   1   4   0   1   0]
 [  1   0   0   3   0   2   0   0   0   0   0   0   5 302   0   0   0   0   0   0   1   0   4   0   0   0]
 [  3   1   7   8   0   0   2   8   1  13   0   0   1   1 237  19  37  14   5   0   9   0   2   0   0   0]
 [  0   2   0   1   0  14  12   1   1   0   0   0   1   1   3 249   7   2   0   1   0   3   0   0   5   0]
 [  6   0   1   0  17   0  74   5   0   0   5  15   0   0   3   1 292   0  48   0   0   0   0  12   4   4]
 [  1  14   0   5   5   0   7  26   0   0  28   3   7   9   2   1   1 245   1   5   2   7  11   0   0   0]
 [  0   0   0   0   2   2   6   0   4   0   0   0   0   0   0   0   7   0  51   2   0   0   0   4   0  28]
 [  0   0   3   2   5  18   0   0   0   0   0   0   0   0   0   2   1   0   0   5 295  10   0   0   5   9   2]
 [  4   0   1   1   0   0   0   1   0   0   5   0   3   1   2   0   0   0   0   1 303   0   4   1   3   0]
 [  2   0   1   0   0   1   3   8   0   0   2   0   1  15   0   0   1   2   0   7   1 350   7   0  49   0]
 [  0   0   0   0   0   0   5   0   0   0   0   0   0  16   0  13   0   3   1   0   0  13  10 357   0   0   0]
 [  0   0   0   0   1   0   0   1   2   0   4   2   0   0   0   0   0   1   2   4   0   0   0 189   2   2]
 [  6   0   0   0   0   0   0   0   0   0   0   0   0   3   0  11   2   0   1   5   0   0   0   3 258   0]
 [  2   1   0   0   5   1   0   0  10   6   0   1   0   0   0   0   4   0  99   7   0   0   0   4   0 266]]
```