

Alexander Palomba

Artificial Intelligence

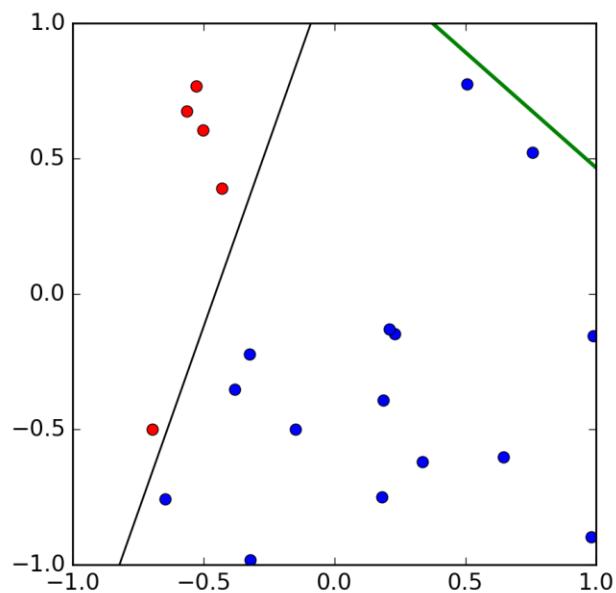
20 September 2016

Homework 01

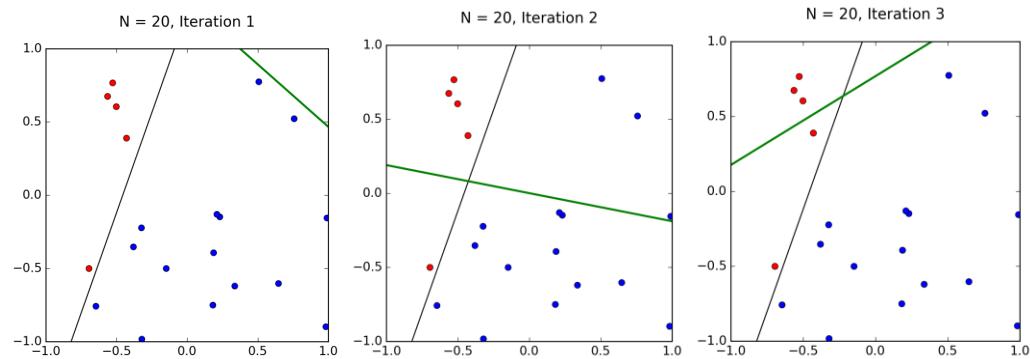
Problem 1.4

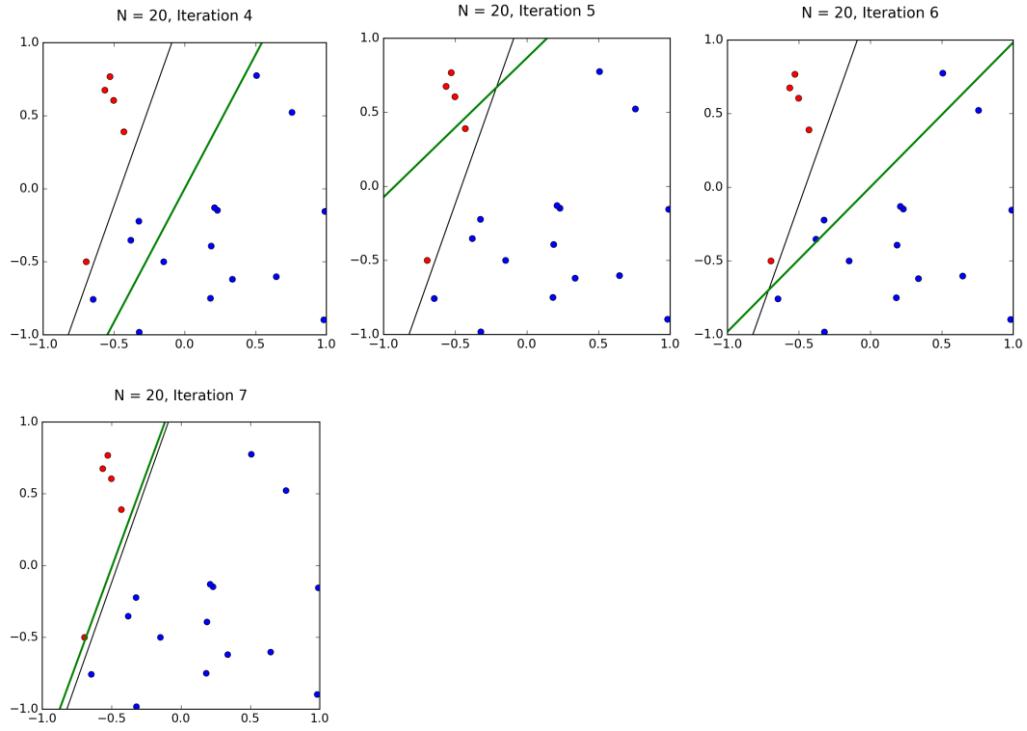
a.

$N = 20$, Iteration 1



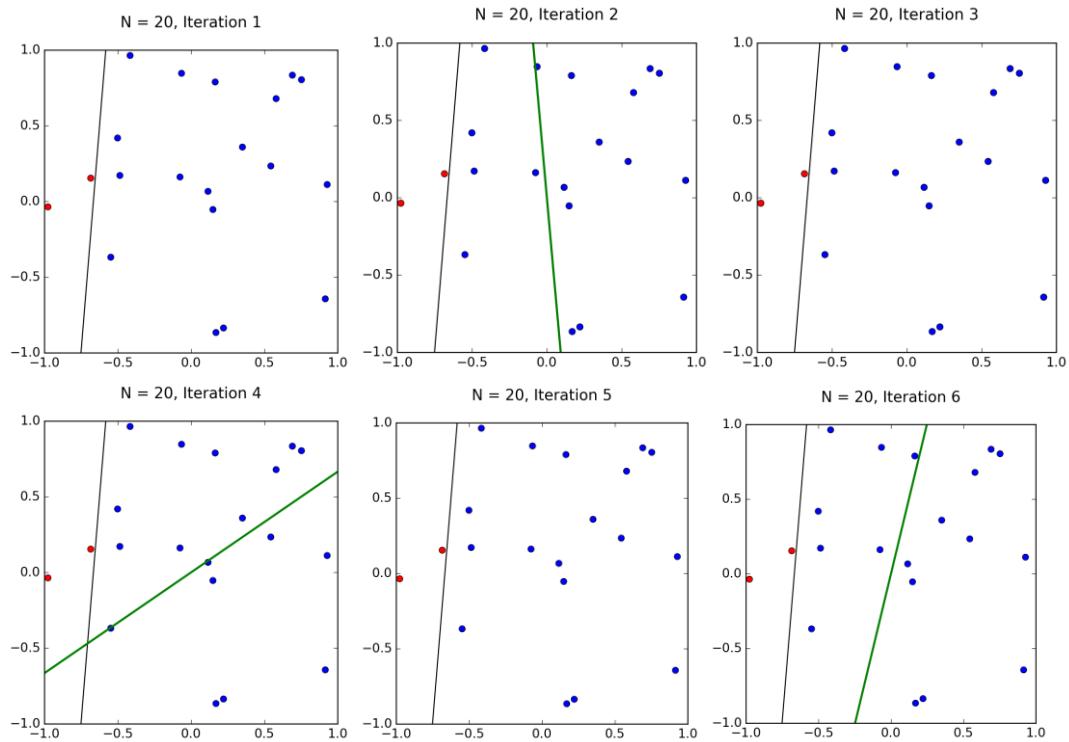
b.

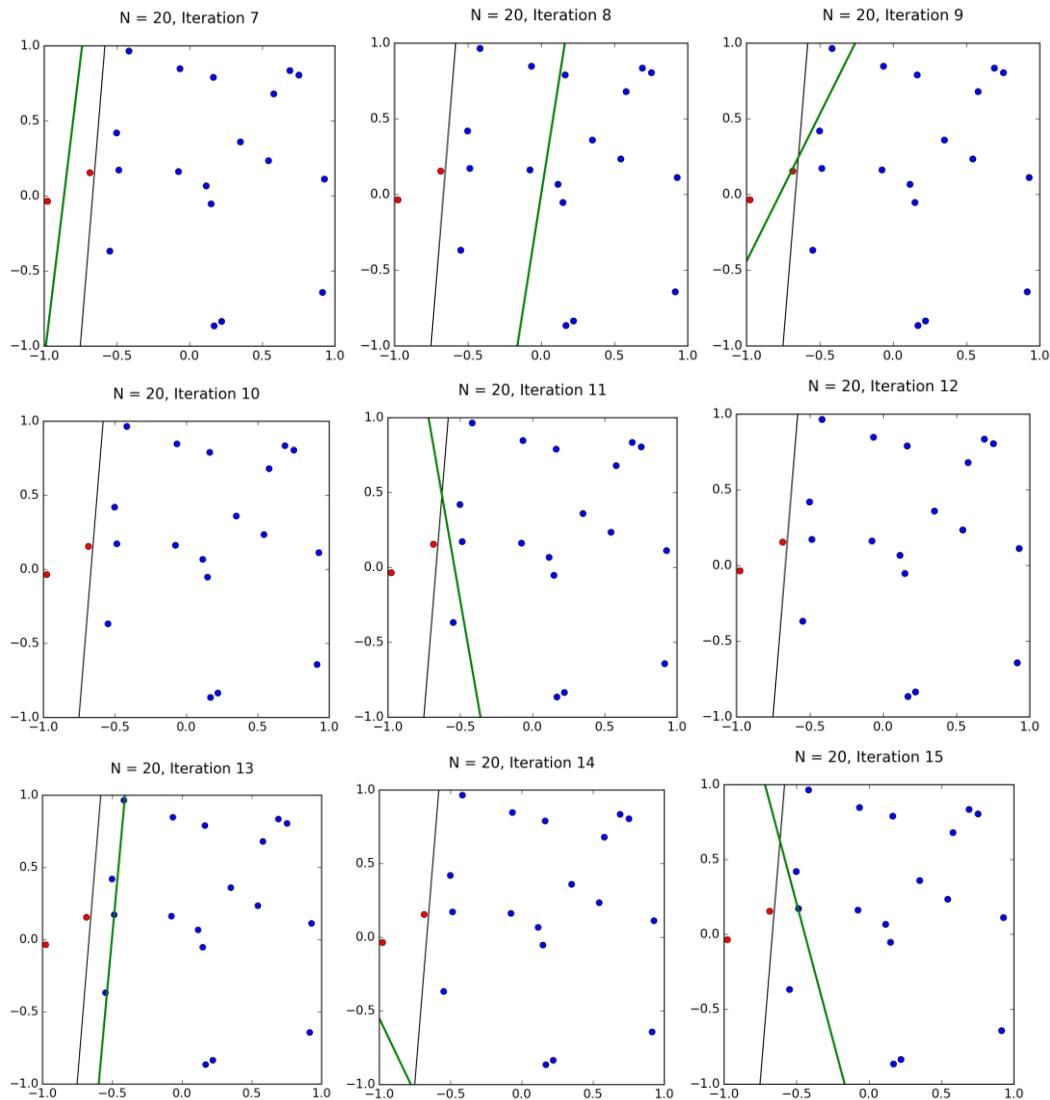


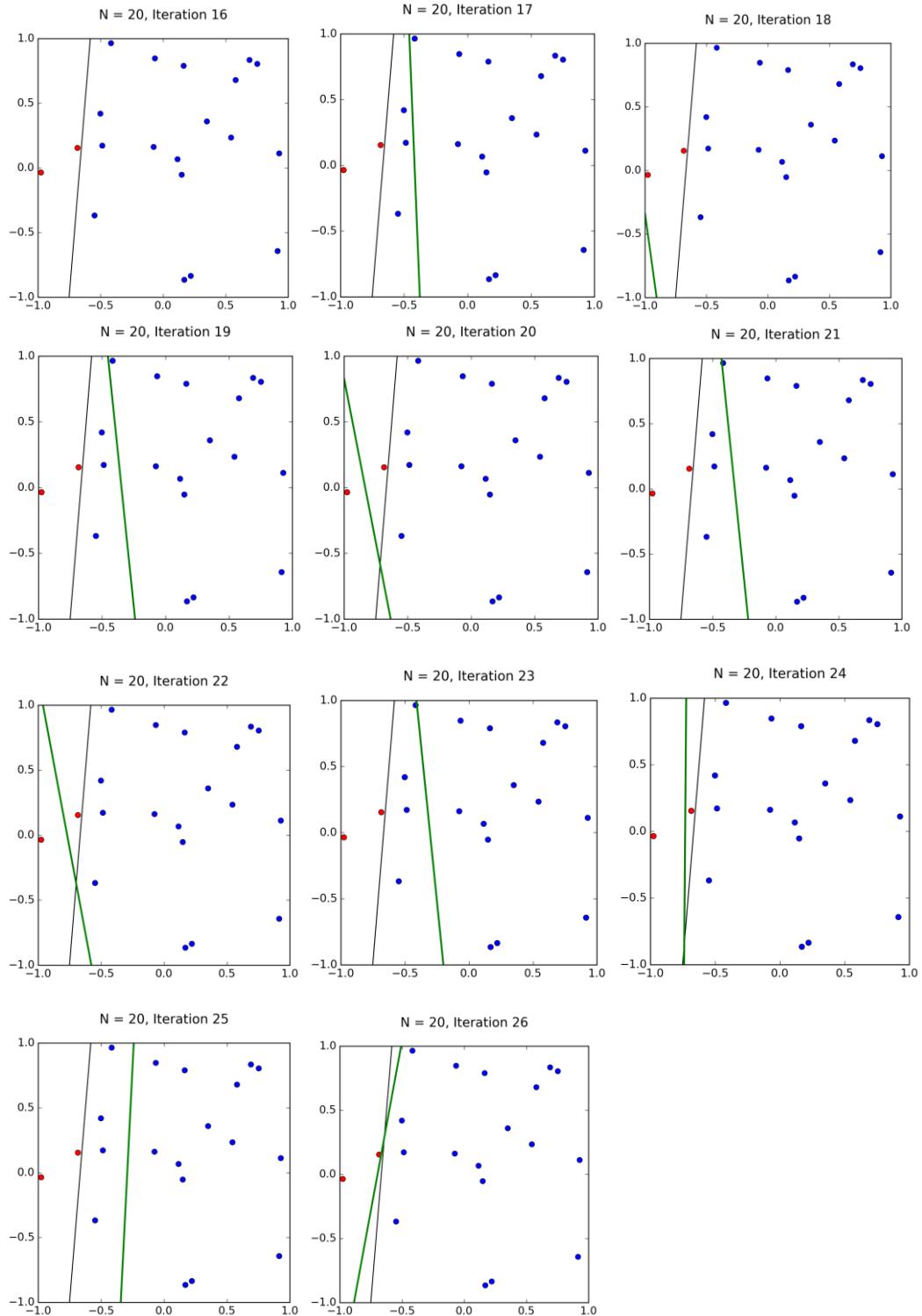


In this final iteration, f is reasonably close to g .

c.

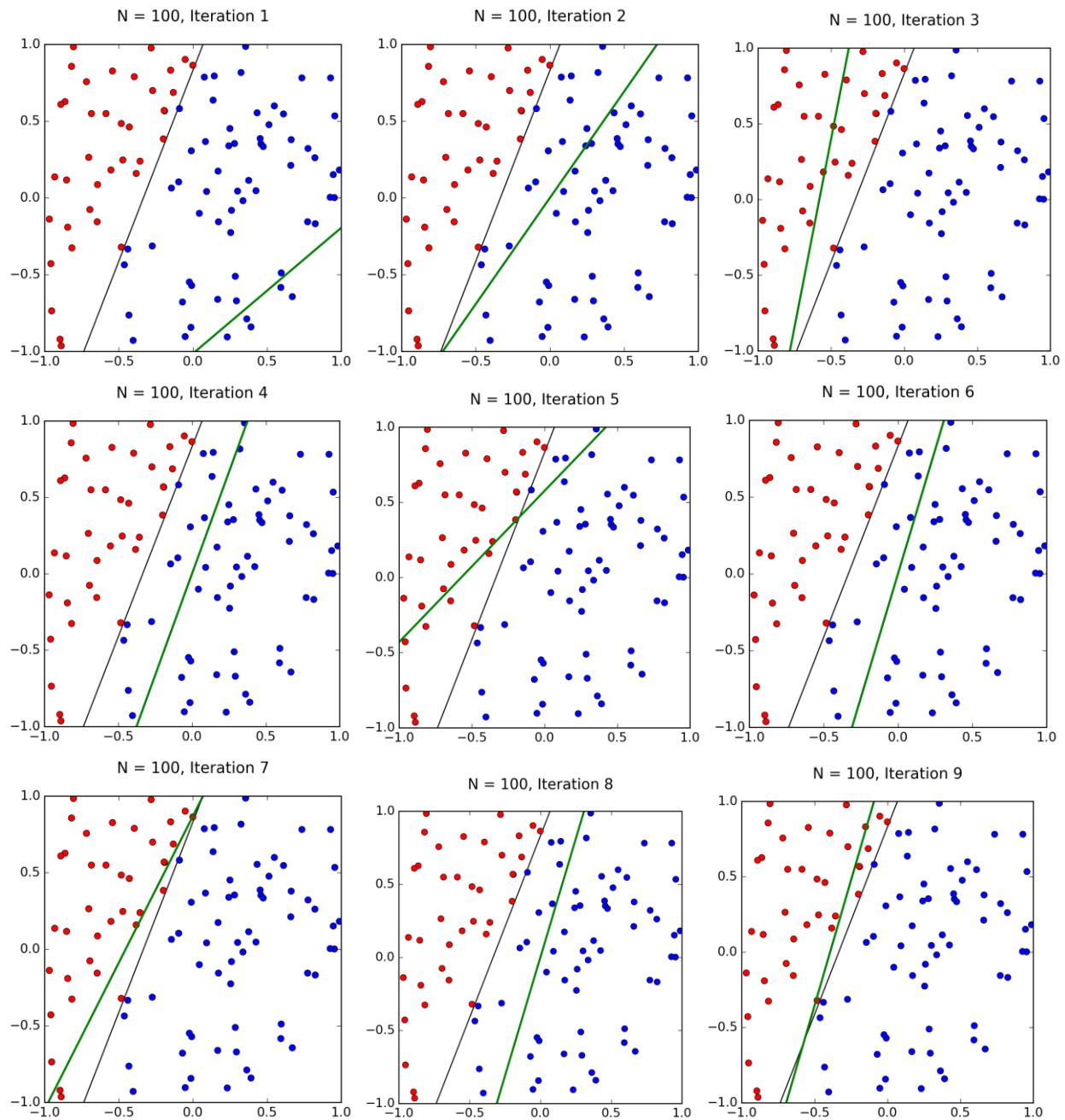


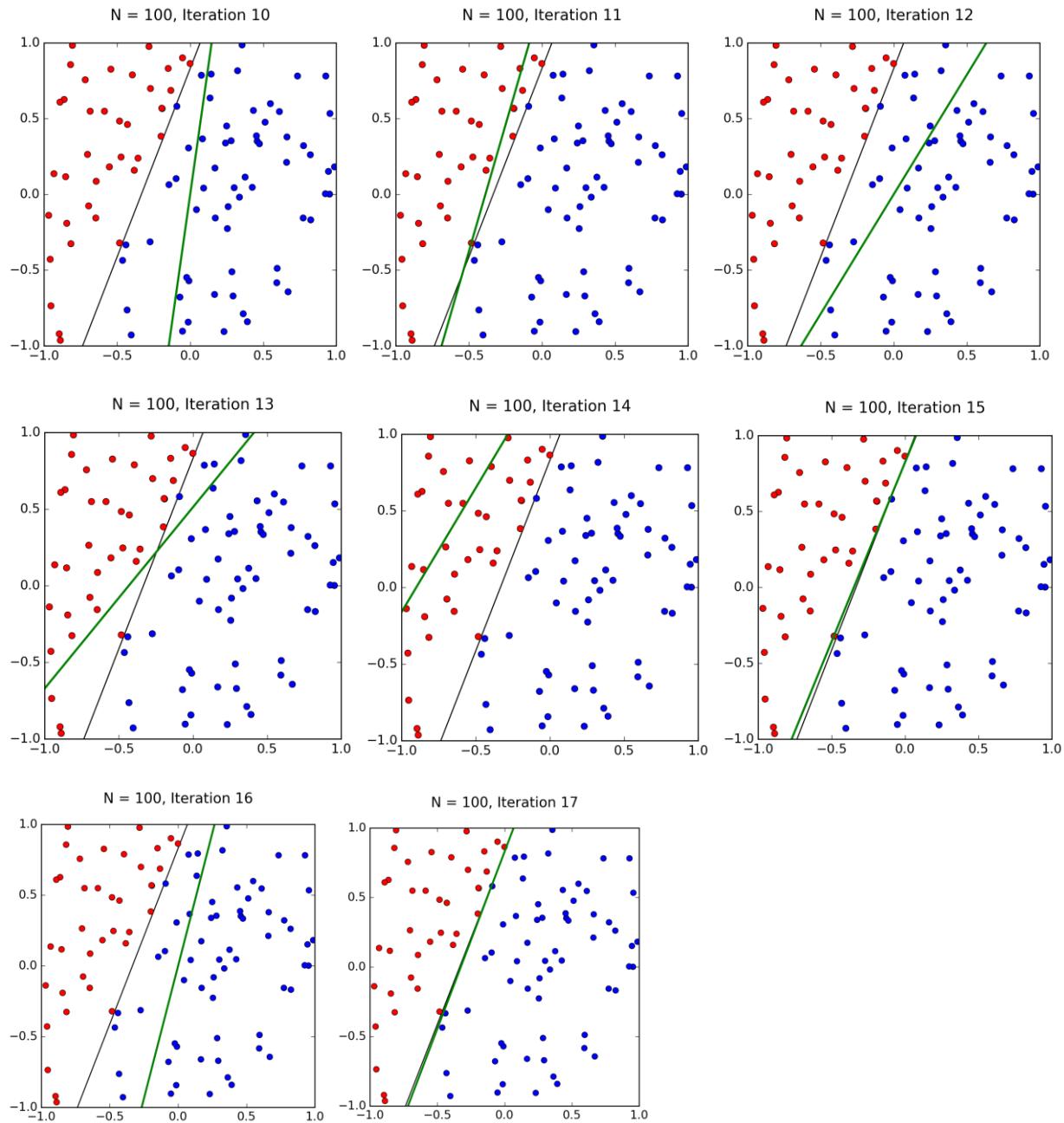




It took the perceptron algorithm significantly more iterations to reach a valid line separating the two classes, and g is not as close to f as it was in the first set.

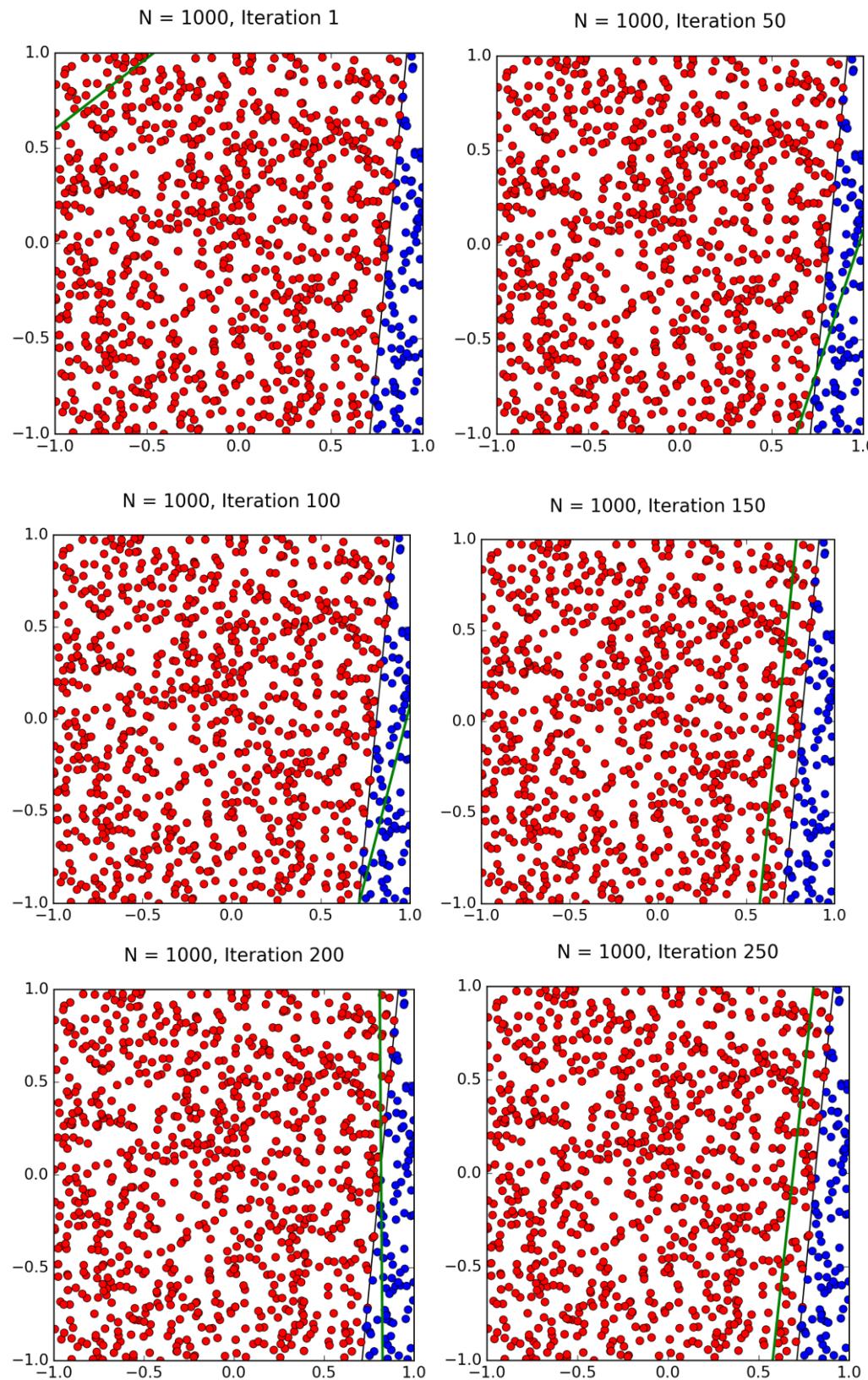
d.

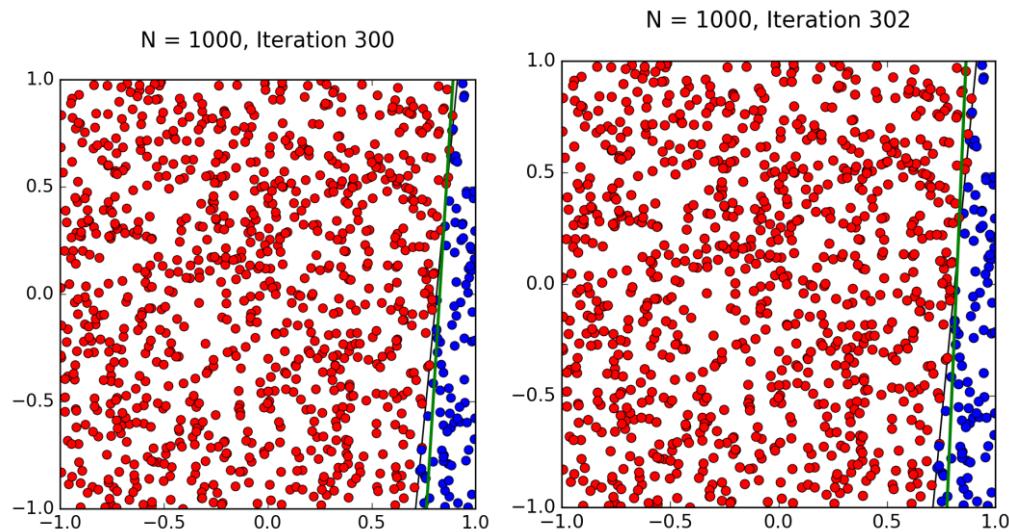




Surprisingly, the perceptron algorithm took only 17 iterations to compute a valid function for g , and it is very close to f .

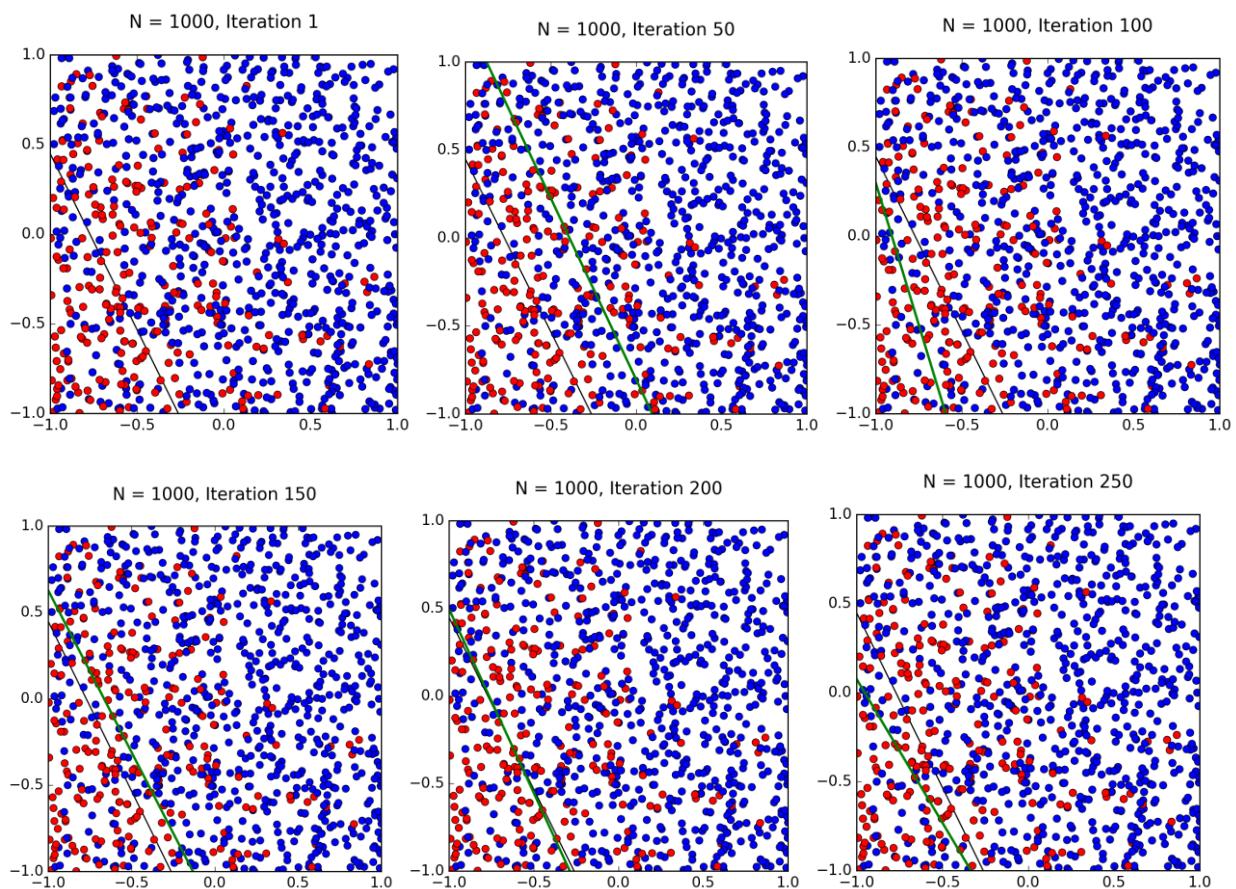
e.

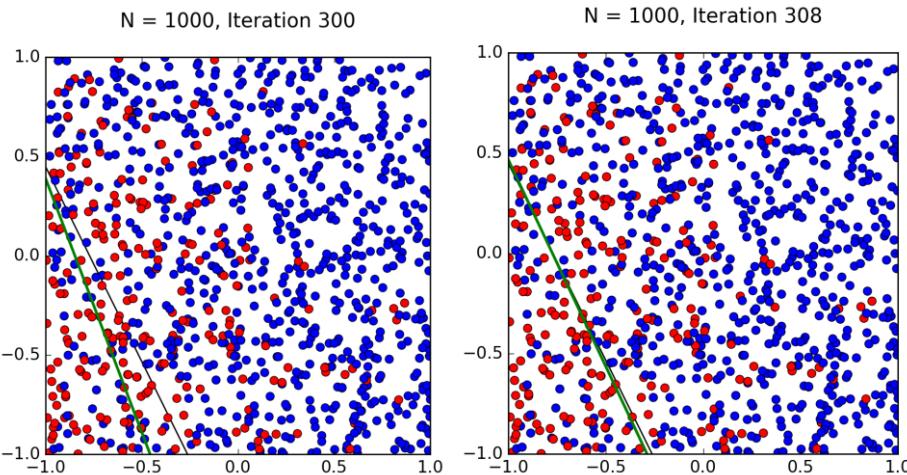




My computer just gave up after 302 iterations, but still got reasonably close to the target function.

f.





My computer stopped at 308, but considering the data that is to follow, I'm assuming this is only because my computer ran out of memory.

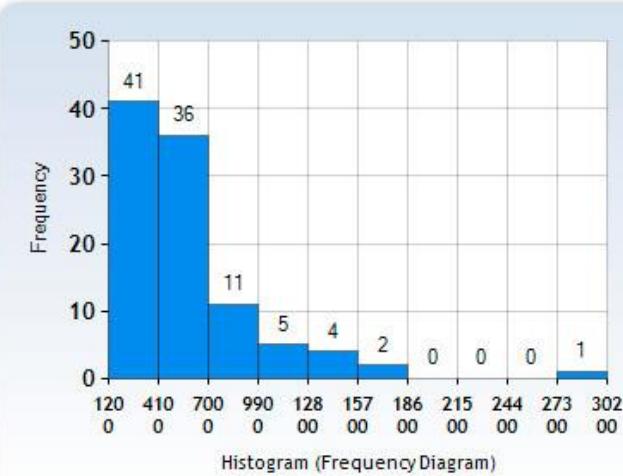
g.

```
Anaconda Prompt
6514
5193
2899
4995
2273
2523
4949
2866
3165
2891
[ 2937.  2004.  2673.  2875.  6101.  3178.  9386.  3885.  6969.
 2540.  6413.  6825.  1215.  8965.  8517.  8340.  3314.  10750.
 4129.  5830.  13055.  6824.  4104.  6648.  3015.  28331.  7040.
 3156.  9356.  4252.  4524.  4460.  14468.  2204.  11864.  1846.
 5777.  3680.  3883.  8145.  5102.  6819.  3489.  6724.  5280.
 1971.  13911.  3734.  5513.  6496.  13810.  2621.  12384.  5955.
 5895.  10511.  6762.  12146.  2696.  9295.  2385.  16360.  3601.
 9447.  3299.  3872.  3018.  5137.  5011.  5830.  6949.  5304.
 2742.  3307.  6982.  16800.  2641.  8795.  3784.  1321.  4602.
 2141.  4628.  1648.  4324.  3153.  2348.  5193.  2731.  7206.
 6514.  5193.  2899.  4995.  2273.  2523.  4949.  2866.  3165.
 2891.]
```

(C:\Users\Alex\Miniconda3) C:\Users\Alex\Documents\GitHub\Artificial_Intelligence\Artificial_Intelligence\palomba-01>

Frequency Table	
Class	Count
1200-4099	41
4100-6999	36
7000-9899	11
9900-12799	5
12800-15699	4
15700-18599	2
18600-21499	0
21500-24399	0
24400-27299	0
27300-30199	1

Your Histogram	
Lowest Score	1215
Highest Score	28331
Total Number of Scores	100
Number of Distinct Scores	98
Lowest Class Value	1200
Highest Class Value	30199
Number of Classes	10
Class Range	2900



h.

Based on all the data I was able to observe, given that d equals the number of dimensions and N the number of unique data points, the size of d affects the running time far more than the size of N ; also, the accuracy of the function g with regards to the target function f , seemed to be more accurate when both N and d were small.

Sources

Code:

Machine Learning Classics: The Perceptron

(<https://datasciencecamp.wordpress.com/2014/01/10/machine-learning-classics-the-perceptron/>)

Pablo Rivera-Rivas (Office Hours)

Histogram:

Easy Histogram Maker (<http://www.socscistatistics.com/descriptive/histograms/>)