HW3

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Task 2

As λ approaches infinity, for w to minimize $E_D(w)$, w would need to approach $\frac{1}{\infty}$ which is 0. So the value of w that minimizes $E_D(w)$ when λ approaches infinity is 0.

Task 3

Sum of squares for $f_1(x) = (20.63 - 9.6)^2 + (26.21 - 4.2)^2 + (24.04 - 2.2)^2 = 121.6609 + 484.4401 + 475.6761 = 1081.7771$
Sum of squares for $f_2(x) = (11.22 - 9.6)^2 + (15.54 - 4.2)^2 + (13.86 - 2.2)^2 = 2.6244 + 128.5956 + 135.9556 = 267.1656$
Since the sum of squared errors is smaller for $f_2(x)$, it is the better solution.

Example Runs

pendigits_training.txt pendigits_test.txt 1 0

w0=-6.3872
w1=0.0276
w2=0.0432
w3=0.0126
w4=0.0176
w5=0.0080
w6=-0.0058
w7=-0.0081
w8=0.0714
w9=-0.0153
w10=-0.0190
w11=0.0117
w12=0.0222
w13=-0.0018
w14=-0.0013
w15=0.0091
w16=0.0382
ID= 3498, output= 3.8514, target value = 4.0000, squared error = 0.0221

pendigits_training.txt pendigits_test.txt 1 1

w0=-6.2611
w1=0.0275
w2=0.0428
w3=0.0126
w4=0.0172
w5=0.0078
w6=-0.0059
w7=-0.0081
w8=0.0713
w9=-0.0154
w10=-0.0191
w11=0.0116
w12=0.0221
w13=-0.0018
w14=-0.0017
w15=0.0090
w16=0.0383
ID= 3498, output= 3.8528, target value = 4.0000, squared error = 0.0217

pendigits_training.txt pendigits_test.txt 2 0

w0=-7.5608
w1=0.0223
w2=0.0001
w3=0.0352
w4=0.0000
w5=0.0049
w6=-0.0000
w7=-0.0299
w8=0.0002
w9=0.0327
w10=-0.0001
w11=0.0694
w12=-0.0004
w13=0.0079
w14=-0.0002
w15=0.0596
w16=-0.0003
w17=-0.0184
w18=-0.0000
w19=0.0093
w20=0.0002
w21=0.0162
w22=-0.0000
w23=0.0398
w24=-0.0002
w25=-0.0041
w26=0.0001
w27=0.0538
w28=-0.0007
w29=-0.0149
w30=0.0002
w31=0.1215
w32=-0.0007
ID= 3498, output= 3.6074, target value = 4.0000, squared error = 0.1542

pendigits_training.txt pendigits_test.txt 2 1

w0=-7.0384
w1=0.0219
w2=0.0001
w3=0.0310
w4=0.0001
w5=0.0043
w6=-0.0000
w7=-0.0345
w8=0.0002
w9=0.0315
w10=-0.0001
w11=0.0678
w12=-0.0004
w13=0.0077
w14=-0.0002
w15=0.0574
w16=-0.0003
w17=-0.0192
w18=-0.0000
w19=0.0091
w20=0.0002
w21=0.0156
w22=-0.0000
w23=0.0401
w24=-0.0002
w25=-0.0050
w26=0.0001
w27=0.0536
w28=-0.0007
w29=-0.0155
w30=0.0002
w31=0.1208
w32=-0.0007
ID= 3498, output= 3.6001, target value = 4.0000, squared error = 0.1599