Machine Learning - Homework 02

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Exercise 1:

Table 1 describes the mean and the standard deviations of x_1, x_2, x_3:

	Mean	Std
x_1	15.00	4.966
x_2	-0.45	1.369
x_3	0.00	1.825

Table 1: Mean and the standard deviations of x_1, x_2, x_3

Table 2 describes the normalized data:

	D_1	D_2	D_3	D_4
x_1	-0.60	1.21	0.4	-1.01
x_2	-1.13	-0.40	1.2	0.33
x_3	-0.55	1.10	-1.1	0.55

Table 2: Normalized data

Exercise 2:

The code for this exercise is attached in the mail.

Exercise 3:

1. The line which should be changed is:

```
error <- BNorm[3, i] - prediction
```

   and it should be replaced by:

```
error <- BNorm[3, i] - (w0+w1*BNorm[1, i]+w2*BNorm[2, i])
```

2. For starting weights $w_0 = w_1 = 0.5, w_2 = 0$, we find that both the Adaline and the Perceptron algorithm do not need more than 8 iterations (i.e. one outerloop). Nevertheless, we observe

that the error variable is different in each algorithm. We believe that while the Adaline algorithm is superior, the large amount of valid decision boundaries and the small data set makes those advantages not perceptible with our starting position ($w_0 = w_1 = 0.5, w_2 = 0$).