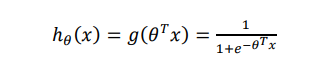
Part1 Matlab3

Part 2

Task 1

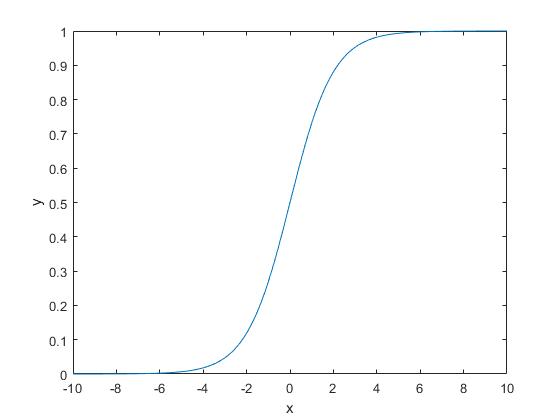
According to



The code changes to

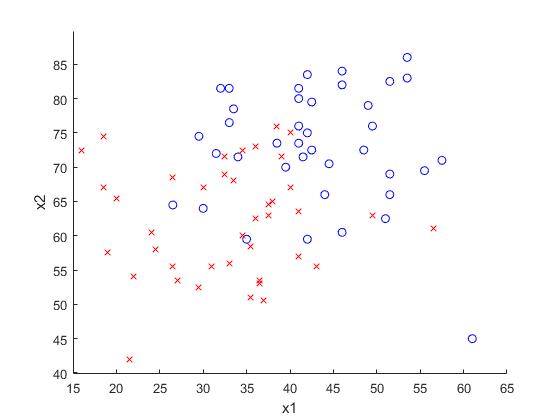
1. output = 1./(1+exp(-z));

The figure shows

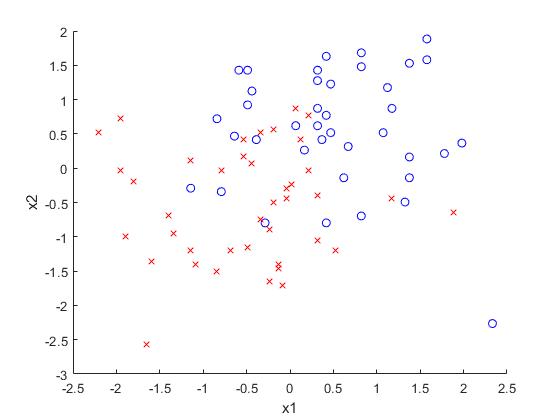


Task 2

Plot the data



Normalized the data



The new figure shows that the

1.1

Task 3

**function** result**=**calculate\_hypothesis**(**X**,**theta**,**training\_example**)**

hypothesis **=** 0.0**;**

%%%%%%%%%%%%%%%%%%%%%%%%

%Calculate the hypothesis for the i-th training example in X.

**[**y **,** x**]** **=** size**(**theta**);**

**for** i **=**1 **:** x

hypothesis **=** hypothesis **+** X**(**training\_example**,** i**)\*** theta**(**i**);**

**end**

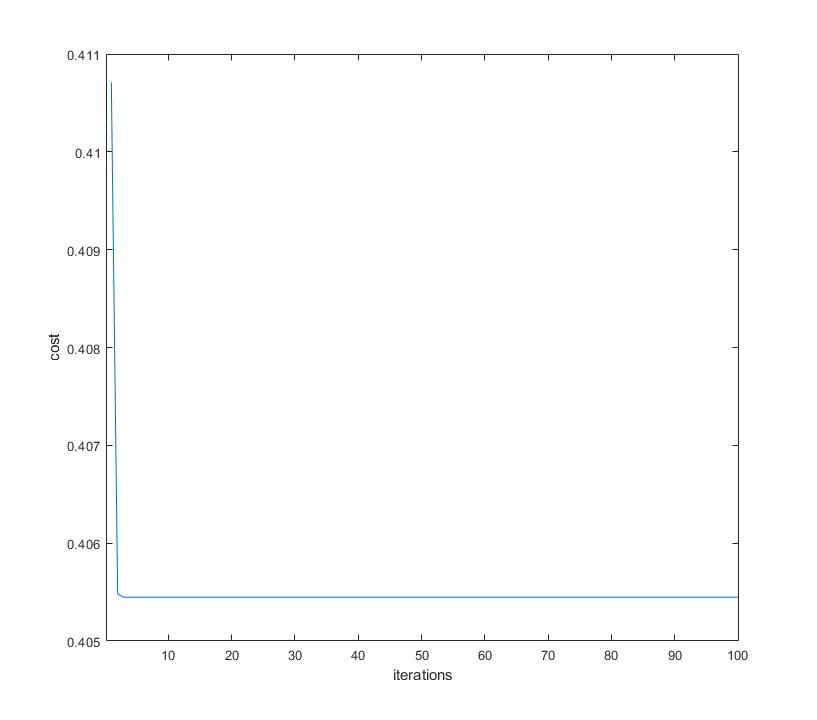
%%%%%%%%%%%%%%%%%%%%%%%%

result**=**sigmoid**(**hypothesis**);**

**end**

%END OF FUNCTION

Task 4



Final error:0.40545

1.2

Task 5

The code changes to

% modify this:

**[**col**,~]** **=** size**(**x**);**

number **=**min**(**x**(:,**2**));**

**for** i **=** 1**:**col

**if(**number **==** x**(**i**,**2**))**

j **=** i**;**

**end**

**end**

y1 **=** x**(**j**,**3**);**

% modify this:

number **=**max**(**x**(:,**2**));**

**for** i **=** 1**:**col

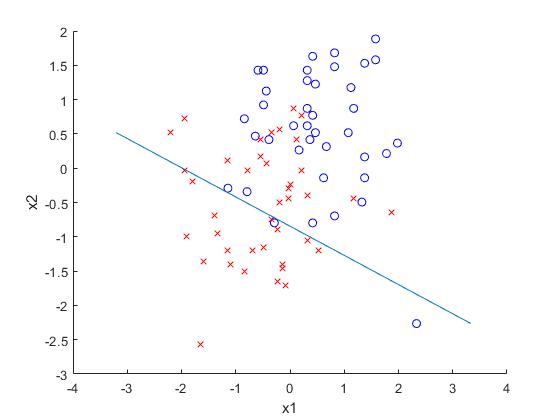
**if(**number **==** x**(**i**,**2**))**

j **=** i**;**

**end**

**end**

y2 **=** x**(**j**,**3**);**



1.3

Task 6

First time

Training error:0.19504

Test error:0.59188

second time

Training error:0.22278

Test error:0.52146

Third time

Training error:0.056239

Test error:0.73733

Task 7

Modeify code

% for question 7, modify the dataset X to have more features (in each row)

% append to X(i),the following features:

% here append x\_2 \* x\_3 (remember that x\_1 is the bias)

X\_2byX\_3 **=** X**(:,** 2**)** **.\*** X**(:,** 3**);**

% here append x\_2 \* x\_2 (remember that x\_1 is the bias)

X\_2byX\_2 **=** X**(:,** 2**)** **.\*** X**(:,** 2**);**

% here append x\_3 \* x\_3 (remember that x\_1 is the bias)

X\_3byX\_3 **=** X**(:,** 3**)** **.\*** X**(:,** 3**);**

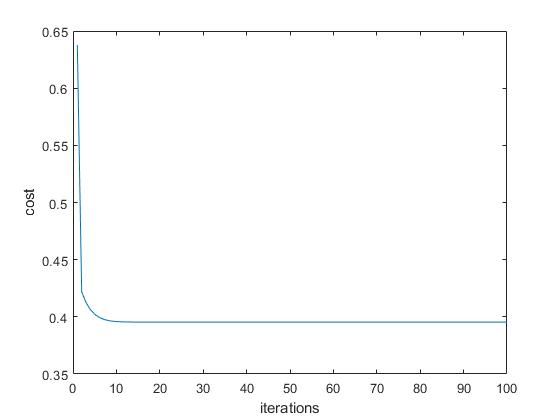
X **=** **[**X**,** X\_2byX\_3**,** X\_2byX\_2**,** X\_3byX\_3**];**

% initialise theta

alpha **=** 0.05**;**

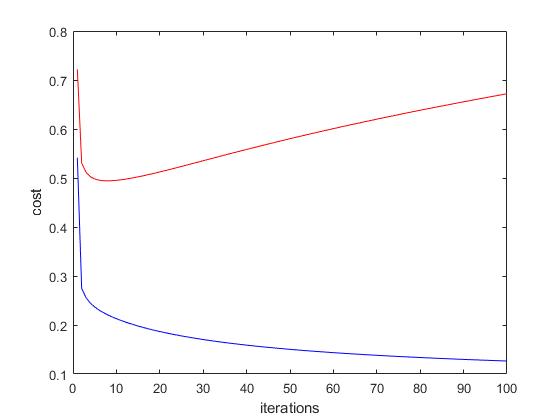
iterations **=** 100**;**

Error:0.39537



Task 8

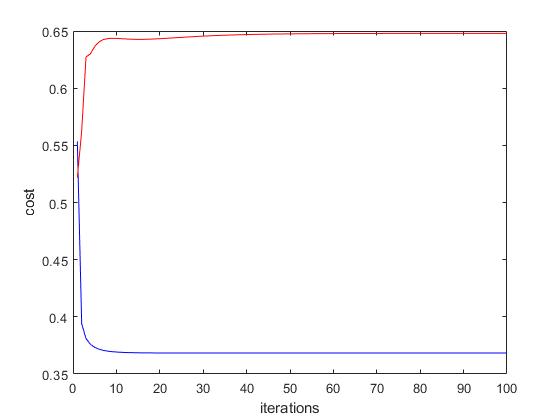
20



Training:0.12649

Test:0.67195

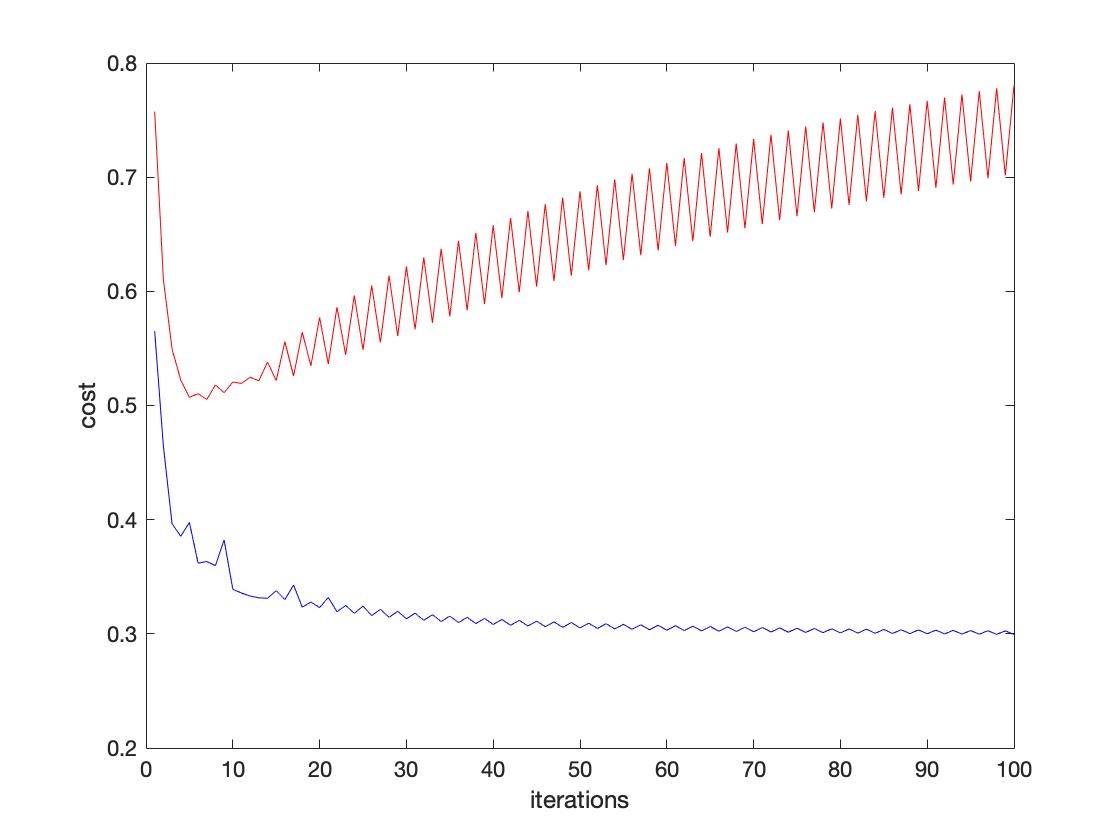
70



Training:0.36832

Test:0.64792

After added a third order x1\*x1\*x1



Training:0.29945

Test:0.7804

overfitting

Task 9

The data points for an xor function are not linearly seperable