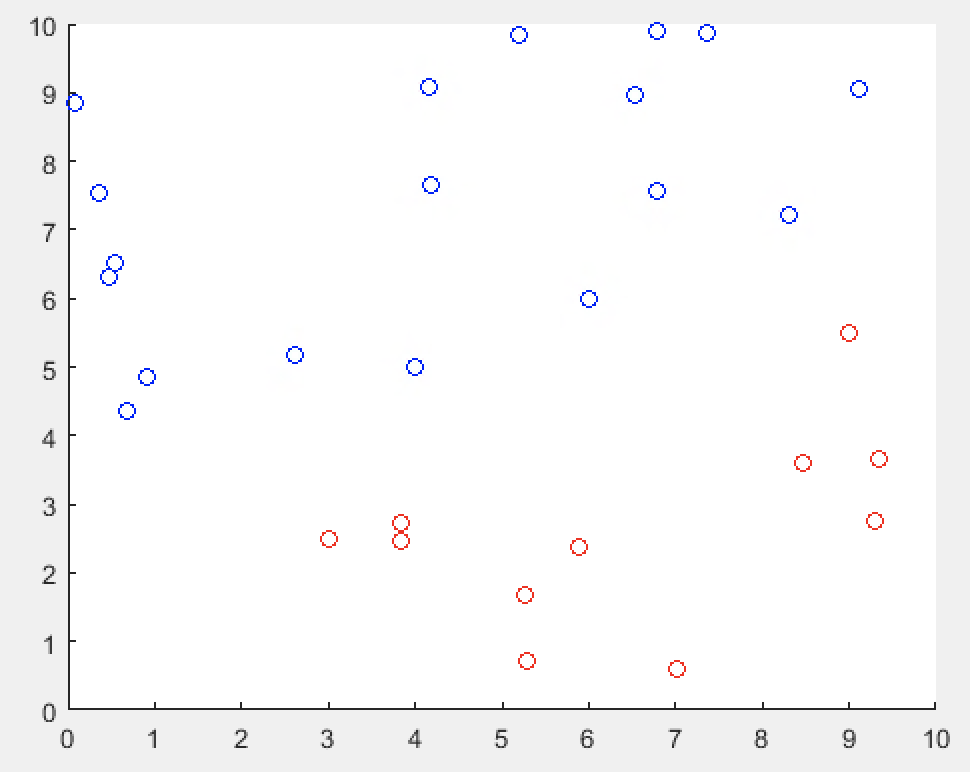
HW#4

**6(a)**

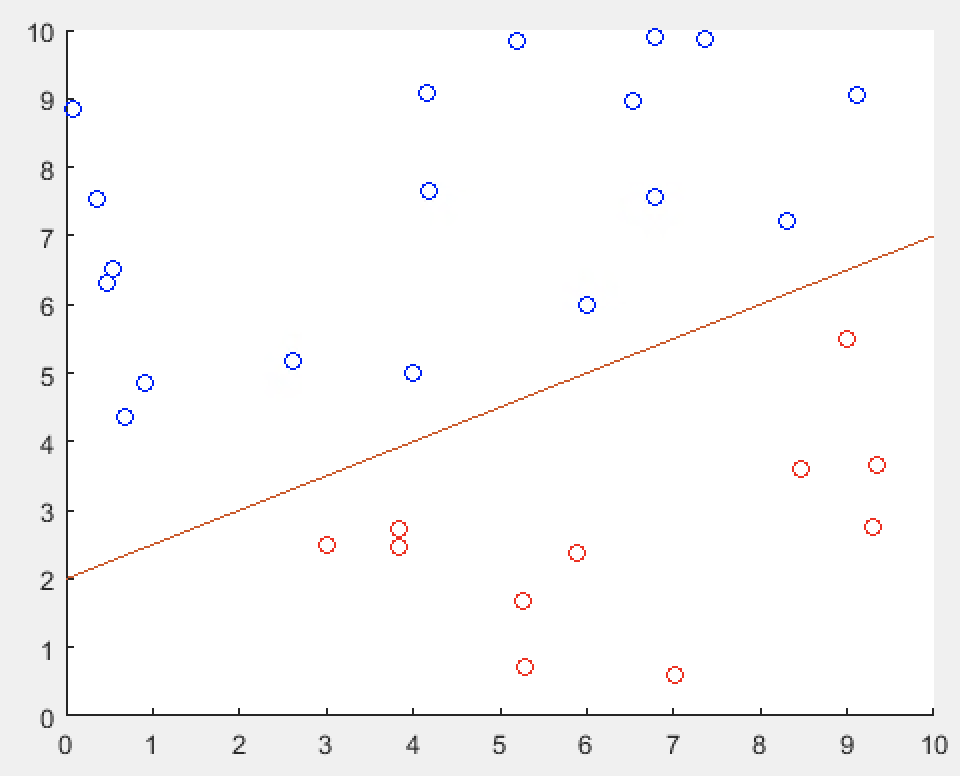
The data is linearly separable.



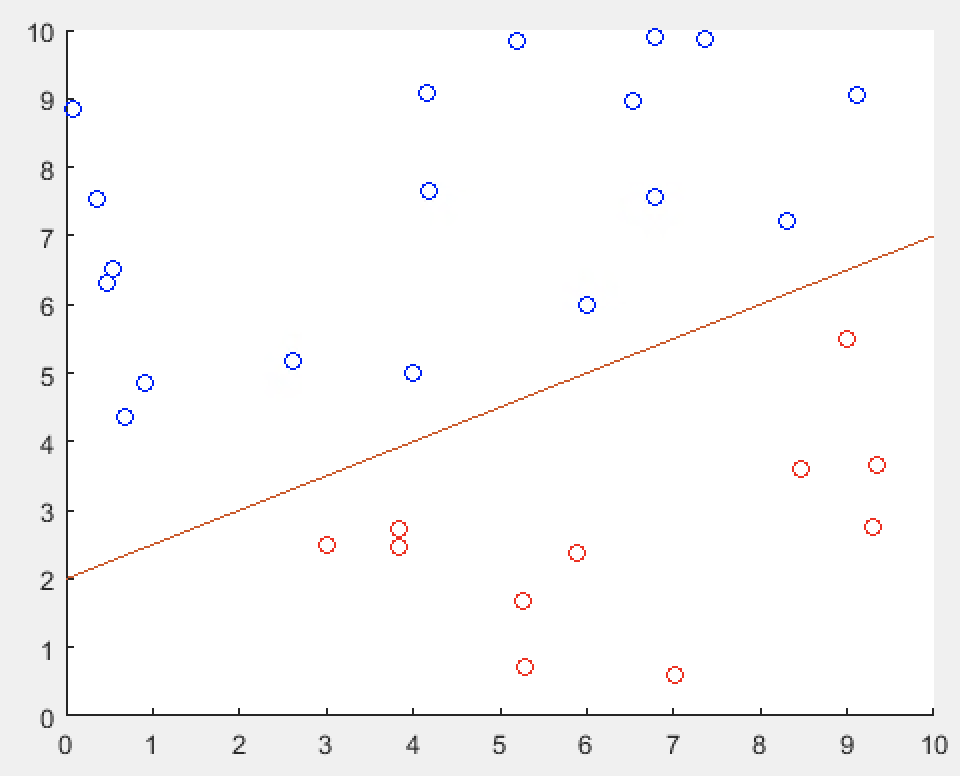
**6(b)**

b = -2.

w = <-0.5, 1>



**6(c)**



α = 0.3347 => 3, 2.5, -1

α = 0.2903 => 9, 5.5, -1

α = 0.3165 => 4, 5, 1

α = 0.3085 => 6, 6, 1

x1 = table2array(Data(:,1));

x2 = table2array(Data(:,2));

y = table2array(Data(:,3));

x = table2array(Data(:,1:2));

hold on;

for i = 1:size(y)

if (y(i) == 1)

scatter(x1(i), x2(i), 'b');

else

scatter(x1(i), x2(i), 'r');

end

end

cvx\_setup

cvx\_begin

variable w(2);

variable b;

minimize( norm(w) ) subject to y.'.\*(w.'\*x.'+b) >= 1;

cvx\_end

a = 0 : 0.01 : 10;

y = 0.5\*a + 2;

plot(a, y);

hold off;

cvx\_begin

variable a(29);

maximize( sum(a)- 0.5\*sum(((x\*x.') \*(a.\*y)).'\*(a.\*y))));

subject to

a >= 0;

sum (a .\* y) == 0;

cvx\_end

w\_vec = zeros(1,2);

for j = 1 : 29

w\_vec(1) = w\_vec(1) + x1(j)\*y(j)\*a(j);

w\_vec(2) = w\_vec(2) + x2(j)\*y(j)\*a(j);

end