%% Problem 5 and 6

x=[-.9,-.6,-.4,-.4,-.1,0,0.4,0.5,0.6,.6];

y=[-3.9,-3.8,-2.9,-1.1,-.9,.7,1.2,1.8,2.3,3.9];

hold on;

scatter(x,y)

axis( [-1 1 -10 10]);

slope = transpose(x)\transpose(y)

fplot(@(x) slope\*x)

hold off;

%% Problem 7-9

x\_1 = [-1.1,-1,-.9,-.8,-.6,-.6,-.2,-.2,.1,.2];

y\_1 = [-4,-3,-4,-2,-2,-.7,.5,3.1,2.9,4.8];

X = [ones(length(x\_1),1) transpose(x\_1)];

b = X\transpose(y\_1)

hold on;

scatter(x\_1,y\_1)

axis([-2 2 -10 10]);

fplot(@(x\_1) b(1) + b(2)\*x\_1)

hold off;

%% Problem 16-21

syms x1 x2;

a = [-4.7,-2.9,-1.3,-1,-.3,1.1,1.5,2.8,3.8,4.7];

b = [1.6,1.8,1.6,.5,-.2,-.8,-1.5,-1.8,-1.7,-1.7];

f = 0;

for i = 1:10

f = f + (x1\*sin(a(i)\*x2)-b(i))^2;

end

g;

hold on;

fimplicit(f == 1)

axis([-7 7 -1.5 1.5])

fimplicit(f == 5, '-o')

fimplicit(f == 10, '--')

fimplicit(f == 25 ,'b')

fimplicit(f == 50 ,'r')

hold off;

%ginput(1)

x1 = 1.9839;

x2 = -0.4548;

vpa(subs(f))

%% Problem 22-25

syms k1 k2;

a\_1 = [-4.7, -2.9, -1.3, -1, -.3, 1.1, 1.5, 2.8, 3.8, 4.7];

b\_1 = [1.6, 1.8, 1.6, .5, -.2, -.8, -1.5, -1.8, -1.7, -1.7];

g\_1 = [];

f\_1 = 0;

v = [k1 k2];

for i = 1:10

f\_1 = f\_1 + (k1\*sin(a\_1(i)\*k2)-b\_1(i))^2;

g\_1 = [g\_1 , (k1\*sin(a\_1(i)\*k2)-b\_1(i))];

end

J = jacobian(g\_1,[k1 k2]);

hessian = 2\*transpose(J)\*J;

k1 = 1.9839;

k2 = -0.4548;

for i = 1:5

update = (transpose(J)\*J)\transpose(J)\*transpose(g\_1);

dx = vpa(subs(update));

k1 = k1 - dx(1);

k2 = k2 - dx(2);

end

k1

k2

sum(subs(f\_1))

clf

hold on;

scatter(a\_1,b\_1)

fplot(@(x)k1\*sin(k2\*x))

hold off;