**File ts\_gaussian.m**

function [out] = ts\_gaussian(x,c1,sigma1,c2,sigma2)

out = [];

for i = 1:length(x)

if(x(i) <= c1)

out = [out; exp(-0.5 \* (((x(i)-c1)/sigma1).^2))];

elseif(x(i) < c2)

out = [out; 1];

else

out = [out; exp(-0.5 \* (((x(i)-c2)/sigma2).^2))];

end

end

end

**File MFexample.m**

c1 = [2,4,6];

c2 = [3,7,13];

sigma1 = [2,4,6];

sigma2 = [4,8,10];

x = [-10:.1:50];

mf = [];

for i = 1:length(c1)

mf = [mf ts\_gaussian(x,c1(i),sigma1(i),c2(i),sigma2(i))];

end

plot(x,mf)

xlabel('X = Universe of Discourse');

ylabel('Membership Grade');

title('2-sided Gaussian Membership Function');

legend('c1=2, c2=3, sigma1=2, sigma2=4', 'c1=4, c2=7, sigma1=4, sigma2=8', 'c1=6, c2=13, sigma1=6, sigma2=10')

%% crossover points, bandwidth

x1 = sqrt(log(.5)\*(-2)) \* sigma1 + c1;

if (x1 > c1)

x1 = (-1)\*sqrt(log(.5)\*(-2)) \* sigma1 + c1

end

x2 = sqrt(log(.5)\*(-2)) \* sigma2 + c2

bandwidth = x2 - x1

**crossover points x1 = [-0.3548 -0.7096 -1.0645]**

**x2 = [7.7096 16.4193 24.7741]**

**bandwidth = 8.0645 17.1289 25.8386**

