clc

clear

close all %closes all figures

format compact

disp('Problem: 8')

t1 = linspace(-30,-1.6,1000);

t2 = linspace(-0.6,40,1000);

x1 = 3\*t1./(1+t1.^3);

y1 = 3\*t1.^2./(1+t1.^3);

x2 = 3\*t2./(1+t2.^3);

y2 = 3\*t2.^2./(1+t2.^3);

hold on

figure(1)

plot(x1,y1,'g')

plot(x2,y2,'r')

legend('-30<=t<=-1.6','-0.6<=t<=40')

hold off

figure(2)

x = linspace(-pi,pi,1000);

hold on

f = cos(x).\*sin(2\*x);

fprime = 2\*cos(x).\*cos(2\*x) - sin(x).\*sin(2\*x);

plot(x,f)

plot(x,fprime,'r')

legend('f','f''')

hold off

figure(3)

v = linspace(0,1200,10000);

k = 1.38\*10^(-23);

m = 5.3\*10^(-26);

T1 = 80;

T2 = 300;

N1 = 1000\*4\*pi\*(m/(2\*pi\*k\*T1))^(3/2)\*v.^2.\*exp(-m\*v.^2/(2\*k\*T1));

N2 = 1000\*4\*pi\*(m/(2\*pi\*k\*T2))^(3/2)\*v.^2.\*exp(-m\*v.^2/(2\*k\*T2));

hold on

title('Speed Distribution N(v) vs. v for Two Temperatures')

xlabel('Velocity (m/s)')

ylabel('Probability Density Function x 1000 (s/m)')

plot(v,N1)

plot(v,N2,'r')

legend('T = 80K', 'T = 300K')

hold off