clear; clc; close all;

% Make domain vector
x=[-6:0.01:6];

% Make polynomial coefficients vector
p=[0.008 0 -1.8 -5.4 54];

% Use polyval to get y
y=polyval(p,x);

% Create graph with title and axis labels
plot(x,y)
title('polynomial')
xlabel('x')
ylabel('y')
clear; clc; close all;

% Create height and temperature vectors
h = [0 600 1500 2300 3000 6100 7900];
T = [100 98.8 95.1 92.2 90 81.2 75.6];

% Find linear polynomial coefficients for temperature vs height
p = polyfit(h, T, 1)

% Find temperature at 5000 m
T5000 = polyval(p, 5000)

% Plot both data points and equation
plot(h, T, '*')
hold on
x = [0:0.01:8000];
y = polyval(p, x);
plot(x, y)
title('Temperature vs Height')
xlabel('Height')
ylabel('Temperature')

p =
-0.0031  99.8863

T5000 =
84.3947
Temperature vs Height

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clear; clc; close all;

% Create x and y vectors
x=[1 2.2 3.7 6.4 9 11.5 14.2 17.8 20.5 23.2];
y=[12 9 6.6 5.5 7.2 9.2 9.6 8.5 6.5 2.2];

% Find fifth-order polynomial coefficients for y vs x
p=polyfit(x,y,5)

% Plot both data points and equation
plot(x,y,'*')
hold on
xl=[0:0.01:25];
y1=polyval(p,xl);
plot(xl,y1)
title('Fifth-order Polynomial')
xlabel('x')
ylabel('y')

P =
     -0.0000    0.0012   -0.0454    0.7485   -4.8644    16.3102
clear; clc; close all;

% Define anonymous function:
function f = @(x) 2*cos(x) - 0.5*x^(1/2) - 1;

% Create plot to find point close to 0:
x = [0:0.01:10];
y = f(x);
plot(x, y)

% Find zero of f using x-value that is close to it
fzero(f, 1)

ans =

0.7683
clear; clc; close all;

% Define anonymous function;
f=@(x) x.^2-5*x.*sin(3*x)+3;

% Create plot to find point close to 0;
x=[0:0.01:5];
y=f(x);
plot(x,y)

% Find zeros of f using x-values that are close to them
fzero(f,2)
fzero(f,3)

ans =
2.3656
ans =
2.8435
clear; clc; close all;

% Create anonymous function for minus the area of the rectangle. Can get
% this equation in terms of a by using the equation of the ellipse to solve
% for b in terms of a.

minusA=@(a) -a.*(10*(1-(a./38).^2).^1/2);

% Find maximum of Area by using max(A)= -min(-A)
[a A]=fminbnd(minusA,0,38)
b=-A/a

a =

26.8701

A =

-190.0000

b =

7.0711

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clear; clc; close all;

% Create domain vector for cardioid
t=[0:0.01:2*pi];

% Create vectors for x and y
x=10*cos(t)-5*cos(2*t); % x-coordinates
y=10*sin(t)-5*sin(2*t); % y-coordinates

% Create plot of cardioid
plot(x,y)
title('Cardioid')
xlabel('x')
ylabel('y')

% Create anonymous function to be integrated
f=@(t)
   ((-10*sin(t)+10*sin(2*t)).^2+(10*cos(t)-10*cos(2*t)).^2).^(1/2);

% Find length of cardioid with integral
length=quad(f,0,2*pi)

length =

80.0000
Cardioid

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clear; clc; close all;

% Create anonymous function for derivative
f=@(x,y) -x.^2*x.^3.*exp(-y)/4;

% Solve differential equation
[x y]=ode45(f, [1 5], 1);

% Plot the solution
plot(x,y)
title('function')
xlabel('x')
ylabel('y')

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