clear; clc; close all;

% Use half-life time to find k by solving the equation 1/2 = e^kt
k = log(1/2) / 13.3

% Define vectors
r = [0:4:48]
R = exp(k*t)

k =
  -0.0521

r =
   0   4   8  12  16  20  24  28  32  36  40
   44  46
R =
Columns 1 through 7
   1.0000  0.8118  0.6591  0.5350  0.4344  0.3526  0.2863
Columns 8 through 13
   0.2324  0.1887  0.1532  0.1244  0.1010  0.0820

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clear; clc; close all;

% Define the points
x1=10.5;
y1=4;
x2=2;
y2=8.6;
x3=-4;
y3=-7;

% Define the matrix on the left and the vector on the right
A=[x1-x2 y1-y2; x2-x3 y2-y3];
b=[(x1^2+y1^2)-(x2^2+y2^2); (x2^2+y2^2)-(x3^2+y3^2)];

% Solve the equation 2Ac=b for c, where c=[Cx Cy], to get center of circle
% c=(1/2)*(A\b)

% Use one of the points to find the radius
r=((x1-c(1))^2+(y1-c(2))^2)^(1/2)

% Display the desired sentence
fprintf('The coordinates of the center are (%3.1f, %3.1f) and the radius is %3.1f',c(1),c(2),r)

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...
clear; clc; close all;

% Define x and y
x=[0.15 0.35 0.5 0.7 0.85]';
y=[0.08909 0.09914 0.08823 0.06107 0.03421]';

% Create the matrix A using the values for c, t, and x
A=[x.^(.5) x.^2 x.^3 x.^4];

% Solve for a0, a1, a2, a3, and a4 with the matrix equation Aa=y
a=A\y
a =
    0.2969
   -0.1258
   -0.3526
    0.2861
   -0.1025

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clear; clc; close all;

% Create domain vector with small enough spacing
x = [-4:0.01:4];

% Create function vector by using element-by-element operations on
domain
y = x.^2./(2+sin(x)+x.^4),

% Plot the graph of y vs x with title and labeled axes
plot(x,y)
xlabel('x')
ylabel('y')
title('y vs x')
clear; clc; close all;

% Create domain vector with small enough spacing
x=[0:0.01:2*pi];

% Create function vector and derivative vector using element-by-element operations on domain vector
f=sin(x).^2.*cos(2*x);
fprime=2*sin(x).*cos(x).*cos(2*x)-2*sin(x).^2.*sin(2*x);

% Plot both functions on the same plot with labeled axes, title, and legend
plot(x,f,'-')
hold on
plot(x,fprime,'--')
xlabel('x')
ylabel('y')
title('A function and its derivative')
legend('function','derivative')
A function and its derivative

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clear; clc; close all;

% Create vector for t using small enough spacing
t=[0:0.01:4*pi];

% Create x and y vectors using element-by-element operations on t vector
x=13*cos(t)-2*cos(6.5*t);
y=13*sin(t)-2*sin(6.5*t);
x=13*cos(t)-2*cos(6.5*t);
y=13*sin(t)-2*sin(6.5*t);

% Plot y vs x with labeled axes and title
plot(x,y)
hold on
xlabel('x')
ylabel('y')
title('Epicycloid')

% Fill in with the color yellow
fill(x,y,'y')
clear; clc; close all;

% Use parametric equation of ellipse to make x and y vectors:
% x=acos(theta)+c1, y=bsin(theta)+c2; where the center is (c1,c2)

t=[0:0.01:2*pi];
x=10*cos(t)+2;
y=4*sin(t)+3;

% Plot the ellipse with labeled axes and title
plot(x,y)
xlabel('x')
ylabel('y')
title('Ellipse')
hold on

% Fill in ellipse with the color green
fill(x,y,'g')