**Exercise1:**

(a)Write a script that calculates the function **f(x)= cos(4\*x)+cos(4.1\*x)** and use it to plot f(x) from x=1 to 10

f = @(x) cos(4\*x) + cos(4.1\*x);

x = linspace(1, 10, 1000);

y = f(x);

plot(x, y);

title('Plot of f(x) = cos(4\*x) + cos(4.1\*x)');

xlabel('x');

ylabel('f(x)');

grid on;

(b) Write a function y = Mid3(a,b,c) that returns the middle of the three values a, b, and c.

function y = Mid3(a, b, c)

y = a + b + c - min([a, b, c]) - max([a, b, c]);

end

(c) Complete the following function so that it performs as specified:

function x = IsPythag(a,b,c)

% x has the value of 1 if a triangle with sides a, b, and c is

% a Pythagorean triangle and 0 otherwise.

% a, b, and c are positive integers.

function x = IsPythag(a, b, c)

sides = [a, b, c];

sides = sort(sides);

x = sides(1)^2 + sides(2)^2 == sides(3)^2;

end

(d) Write a function called ‘check1’ that takes a vector as input and prints an error message for all vectors that do not have exactly three components.

function check1(vec)

if numel(vec) ~= 3

error('Input vector must have exactly three components.');

else

disp('Input vector is valid.');

end

end

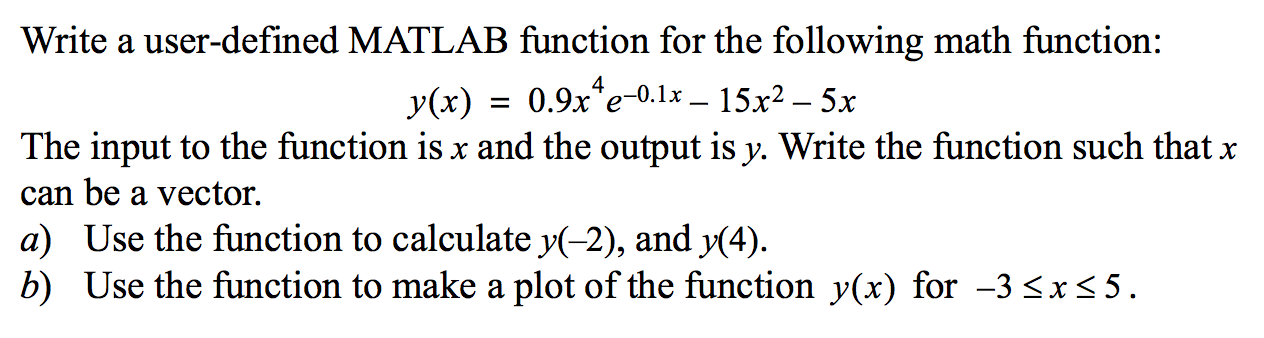
(e) Write a MATLAB **function** that accepts time ***t*** as an input and returns a voltage corresponding to the following equation: *v* = e-*t*sin(5*t*).

function v = CalculateVoltage(t)

v = exp(-t) .\* sin(5 \* t);

end

**Exercise2:**

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**﻿**

function y = myFunction(x)

y = 0.9 \* x.^4 .\* exp(-0.1 \* x) - 15 \* x.^2 - 5 \* x;

end

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y\_minus\_2 = myFunction(-2);

y\_4 = myFunction(4);

disp(['y(-2) = ', num2str(y\_minus\_2)]);

disp(['y(4) = ', num2str(y\_4)]);

x\_values = linspace(-3, 5, 1000);

y\_values = myFunction(x\_values);

figure;

plot(x\_values, y\_values, 'LineWidth', 2);

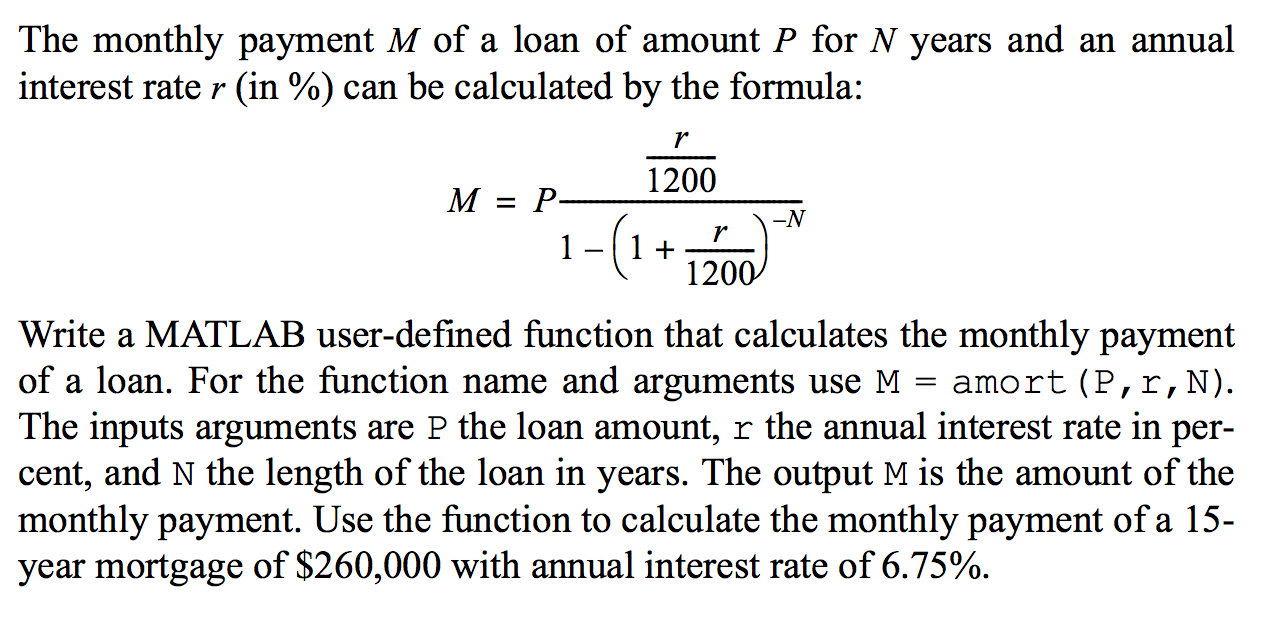
title('Plot of y(x) = 0.9x^4 \* e^(-0.1x) - 15x^2 - 5x');

xlabel('x');

ylabel('y(x)');

grid on;

**Exercise3:**

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function M = amort(P, r, N)

r = r / 100;

monthly\_rate = r / 12;

num\_payments = N \* 12;

M = P \* (monthly\_rate / (1 - (1 + monthly\_rate)^-num\_payments));

end

loan\_amount = 260000;

annual\_interest\_rate = 6.75;

loan\_years = 15;

monthly\_payment = amort(loan\_amount, annual\_interest\_rate, loan\_years);

disp(['Monthly Payment: $', num2str(monthly\_payment)])

**﻿**

**Exercise 4: Write a user defined MATLAB function for he following math function:**

**﻿**

The input to the function is (in radians) and the output is r. Write the function such that can be a vector.

1. Use the function to calculate and .
2. Use the function to plot (polar plot) for .

**﻿** function result = polarFunction(theta)

result = 2 \* cos(theta) .\* sin(theta) .\* sin(theta/4);

end

theta\_1 = 3\*pi/4;

theta\_2 = 7\*pi/4;

result\_1 = polarFunction(theta\_1);

result\_2 = polarFunction(theta\_2);

disp(['r(3\*pi/4) = ', num2str(result\_1)]);

disp(['r(7\*pi/4) = ', num2str(result\_2)]);

theta\_values = linspace(0, 2\*pi, 1000);

r\_values = polarFunction(theta\_values);

figure;

polarplot(theta\_values, r\_values, 'LineWidth', 2);

title('Polar Plot of r(\theta) = 2cos(\theta)sin(\theta)sin(\theta/4)');

grid on;