### Homework 8\_1

Problem 1:

% Define the function

syms x;

y= cos(x);

% Differentiate the function

dy\_dx = diff(y);

% Prompt the user for x

x\_value = input('Enter a value x to evaluate the derivative at: ');

derivative\_at\_x = subs(dy\_dx, x, x\_value);

% Convert to a numeric value

derivative\_at\_x = double(derivative\_at\_x);

% Display the derivative and its value at x

disp(['The derivative dy/dx is: ' char(dy\_dx)]);

disp(['The value of the derivative at x = ' num2str(x\_value) ' is: ' num2str(derivative\_at\_x)]);

The derivative dy/dx is: -sin(x)

The value of the derivative at x = 4 is: **0.7568**

Problem 2:

The derivative dy/dx is: sin(2\*x^2) + 4\*x^2\*cos(2\*x^2)

The value of the derivative at x = 4 is: **53.9417**

Problem 3:

The derivative dy/dx is: - cos(x)/x^2 - sin(x)/x

The value of the derivative at x = 4 is: **0.23005**

Problem 4:

The derivative dy/dx is: exp(-x^2) - 2\*x^2\*exp(-x^2)

The value of the derivative at x = 0.1 is: **0.97025**

Problem 5:

The derivative dy/dx is: cos(x) - x\*sin(x)

The second derivative dy^2/dx^2 is: - 2\*sin(x) - x\*cos(x)

The value of the derivative at x = 4 is: **4.1282**

Problem 6:

% Define the function

syms x;

y = 400\*exp(-200\*x);

% Integrate the function

indefinite\_integral = int(y, x);

% Prompt the user for limits

lower\_limit = input('Enter the lower limit of integration: ');

upper\_limit = input('Enter the upper limit of integration: ');

% Integrate with limits

definite\_integral = int(y, x, lower\_limit, upper\_limit);

% Convert to a numeric value

definite\_integral = double(definite\_integral);

% Display the result

disp(['The indefinite integral, Y is: ' char(indefinite\_integral) ' +C']);

disp(['The definite integral of Y from ' num2str(lower\_limit) ' to ' num2str(upper\_limit) ' is: ' num2str(definite\_integral)]);

The indefinite integral, Y is: 3\*x^4 +C

The definite integral of Y from 0 to 2 is: **48**

Problem 7:

The indefinite integral, Y is: -2\*exp(-200\*x) +C

The definite integral of Y from 0 to 0.001 is: **0.36254**

Problem 8:

The indefinite integral, Y is: (5\*sin(4\*x))/4 - 5\*x\*cos(4\*x) +C

The definite integral of Y from 0 to 1 is: **2.3222**

Problem 9:

The indefinite integral, Y is: -(5\*exp(-4\*x)\*(4\*x + 1))/4 +C

The definite integral of Y from 0 to 2 is: **1.2462**

Problem 10:

A=[(1.2/3)​x^3−(3.4​/2)x^2+5.1x] x = 0,3

A=[(1.2/3)​(3^3)−(3.4​/2)​(3^2)+5.1(3)]−[0]

**Q10:** **A = 10.8**

Aapprox =(1.2(3/2)2−3.4(3/2)+5.1)⋅3

**Q11:** **Aapprox = 10.7**

Aapprox =1/2 \* (5.1) + (1.2(3)^2−3.4(3)+5.1)]⋅3

**Q12: Aapprox = 12.15**