MTH232

Applications of Definite Integration Using the Symbolic Math Toolbox

Project 2– Exercises

NAME: ____________________________________________
SECTION: __________________________________________
INSTRUCTOR: _______________________________________

Exercise 1:
Find all the zeros of \( f(x) = 4 \cdot x^3 - x^2 - 4 \cdot x + 1 \)
(1) Answer: ______________________________

Exercise 2:
Use MATLAB to find the critical numbers, absolute extrema, graph with key points labeled for
\( f(x) = x^2 e^{x/3} \) on interval [-8,2]. Submit the completed graph.

a.) The critical numbers are:
(2) Answer: ______________________________

b.) Absolute max:
(3) Circle one: 1. the point \((0, 0)\)
2. the point \((-6, 36e^{-2})\)
3. the point \((2, 4e^{2/3})\)
4. none of the above

c.) Absolute min:
(4) Circle one: 1. the point \((0, 0)\)
2. the point \((-6, 36e^{-2})\)
3. the point \((2, 4e^{2/3})\)
4. none of the above

d.) Submit the graph.
(5) Attach your graph to the worksheet.
Exercise 3:
Given, \( f(x) = x^4 + 4x^3 + 4x^2 + 4 \).
Use MATLAB to find:

a.) zeros
   \( \textbf{(6) Circle one:} \ 1. \ x=0 \ 2. \ x=1 \ 3. \ \text{there are no zeros} \ 4. \ \text{none of the above} \)

b.) critical numbers
   \( \textbf{(7) Answer:} \ \)_____________________________

c.) Relative max using the Second Derivative Test. (Note that fpp can be found by using either diff(fp) or diff(f,2). The 2 in diff(f,2) means differentiate twice).
   \( x= \)
   \( \textbf{(8) Answer:} \ \)_____________________________

d.) Relative min(s)? \( x = \)
   \( \textbf{(9) Answer:} \ \)_____________________________

e.) Find \( f''(x_{r,\max}) = \)
   \( \textbf{(10) Answer:} \ \)_____________________________

f.) Find \( f''(x_{r,min}) = \)
   \( \textbf{(11) Answer:} \ \)_____________________________

g.) Submit the graph labeled with min and max. (use “text” command.)
   \( \textbf{(12) Attach your graph to the worksheet.} \)

Exercise 4:
Use MATLAB to graph, find and label points of intersection and determine the area between \( f(x) = x^2 + x + 8 \) and \( g(x) = x + 12 \).

a.) Points of intersection (x coordinates):
   \( x= \)
   \( \textbf{(13) Answer:} \ \)_____________________________

b.) the area is:
   \( \textbf{(14) Answer:} \ \)_____________________________

c.) Submit the graph
   \( \textbf{(15) Attach your graph to the worksheet.} \)
Exercise 5:

(a) Graph the region bounded by \( y = \sqrt{x+5} \), \( x-axis \), \( x = 1 \) and \( x = 5 \)
Submit the Graph:
(16) Attach your graph to the worksheet.

(b) Find the volume when the region is rotated around the x-axis.
(17) Circle one:  1. \( 16\pi \)  2. \( 32\pi \)  3. \( 14\pi \)  4. \( 18\pi \)

Exercise 6:
The region bounded by \( y = x^3 \) and \( y = 2x^2 \) is rotated around the y-axis.

(a) graph the region. Note: do not plot the functions outside of the intersection points!
(18) Attach your graph to the worksheet.

(b) find the volume
(19) Circle one:  1. \( 16\pi \)  2. \( 8\pi/5 \)  3. \( 8\pi/3 \)  4. \( 16\pi/5 \)