MT110: Calculus and Analytic Geometry

Worksheet 13

Due 3:10 pm, Fri Dec 7

fall 2018

Roll# Student 1: _____ Roll# Evaluator 1: _____

Roll# Student 2: _____ Roll# Evaluator 2: _____

Note: Attempt the questions in a proper sequence.

Problem 1 _____ /[10 Marks]

The graph of g (Fig:1)consists of two straight lines and a semi -circle. Use it to evaluate the integral.

$$I = \int_0^7 g(x)dx$$

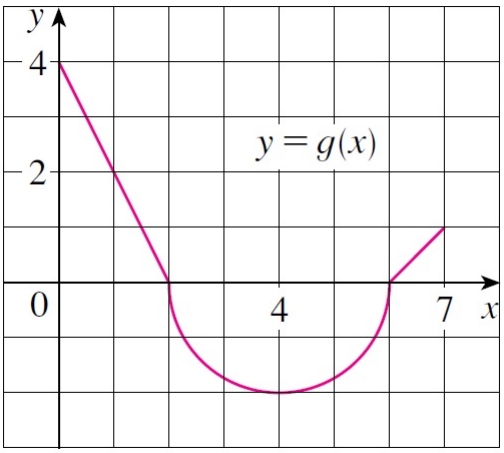

Figure 1: $g(x)$

Problem 2 _____ /[10 Marks]

(i) Express the limit as a definite integral on the given interval.

$$I_1 = \lim_{x\to\infty} \sum_{i=1}^{n} \frac{x_i}{x_i^2 + 4}\Delta x, \quad [1, 3]$$

(ii) Express the a definite integral on the given interval as a Riemann sum.

$$I_2 = \int_0^2 \frac{1}{x^2 + 2}dx$$

Problem 3 _____ /[10 Marks]

(a) Use the property 8 (page 381) to estimate the integral $\int_0^2 \frac{1}{1+x^2}dx$

(b) For the following integral

$$\int_0^6 \frac{x}{x+1}dx$$

(i) Use property 8 to estimate its bounds

(ii) Use the Midpoint Rule with $n = 3$ to approximate the integral.

Problem 4 _____ /[20 Marks]

(i) Use the FOTC(Fundamental theorem of calculus) part 1 to find the derivative.

$$\frac{d}{dx}\int_{\sin(x)}^1 \sqrt{1+t^2}dt$$

(ii) Use the FOTC(Fundamental theorem of calculus) part 2 to find the integrals.

(a) $I_4 = \int_0^3 (2\sin(x) - e^x)dx$

(b) $I_5 = \int_{-2}^2 f(x)dx$ where

$$f(x) = \begin{cases} 2, & -2 \le x \le 0 \\ 4 - x^2, & 0 < x \le 2 \end{cases}$$

Problem 5 _____ /[10 Marks]

A honeybee population starts with 100 bees and increases at a rate of $n'(t)$ bees per week. What does $100 + \int_0^{15} n'(t)dt$ represents?

Problem 6 _____ /[10 Marks]

If $f(x)$ is the slope of a trail at a distance of x miles from the start of the trail, what does $\int_3^5 f(x)dx$ represents?

Problem 7 _____ /[10 Marks]

Water flows from the bottom of a storage tank at a rate of $r(t) = 400 - 4t$ liters per minute,where $0 \le t \le 50$.Find the amount of water that flows out from the tank between 10 min to 20 min ?

Problem 8

Turn off your PCs and place the chairs in their proper positions.
