

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 5

MATHEMATICS 1001

FALL 2019

Due: Friday, October 25th, 2019 at 4:00pm. SHOW ALL WORK.

Note: You are encouraged to complete the WebAssign problem sets “The Fundamental Theorem of Calculus II” and “Definite Integrals by Parts”, and the “Worksheet on Definite Integrals as Limits of Riemann Sums”, before you work on this assignment.

1. Evaluate $\int_2^3 x^2(4x + 3) dx$ in two ways:
 - (a) by computing the limit of a Riemann sum
 - (b) using the Fundamental Theorem of Calculus
2. Use the Fundamental Theorem of Calculus to evaluate each of the following definite integrals.

(a) $\int_1^e \sqrt{x} \ln(x) dx$

(b) $\int_{-\frac{3}{2}}^0 \frac{1}{2x^2 + 6x + 9} dx$

(c) $\int_0^\pi \sin(2t) \cos(2t) \sin(\cos(2t)) dt$

(d) $\int_{-3}^5 |4 - x^2| dx$

3. Given the piecewise function

$$f(x) = \begin{cases} 5x + 6, & x < -2 \\ -4, & -2 \leq x \leq 1 \\ 3\sqrt{x} - 7, & x > 1 \end{cases}$$

determine $\int_{-1}^9 f(x) dx$.

4. Use the Fundamental Theorem of Calculus to find the area of the region which lies under the curve $f(x) = \tan\left(\frac{x}{3}\right)$ and between the lines $x = \frac{\pi}{2}$ and $x = \pi$.