MEMORIAL UNIVERSITY OF NEWFOUNDLAND
DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 5 **MATHEMATICS 1001** WINTER 2024

Due: Monday, March 4th, 2024 at 11:59pm. See the Gradescope Handout for sub-mission information.

> **Note:** You should complete the WebAssign problem sets "The Fundamental The-orem of Calculus I", "The Fundamental Theorem of Calculus II", and "Definite Integrals by u-Substitution", as well as Worksheet 2.3, before you work on this assignment.

1. Use the First Fundamental Theorem of Calculus to find $f'(x)$, given

$$f(x) = \int_{x}^{x^2} \csc(t^3)\, dt.$$

2. Use the Second Fundamental Theorem of Calculus to evaluate each of the following definite integrals.

   (a) $\displaystyle\int_{1}^{3} x \ln(x)\, dx$

   (b) $\displaystyle\int_{0}^{\frac{\pi}{6}} \tan^5(x) \sec^2(x)\, dx$

   (c) $\displaystyle\int_{-5}^{4} |x^2 - 9|\, dx$

3. Find the area of the region which lies under the curve $f(x) = x^3 - 2x + 4$, above the x-axis, and between the y-axis and the line $x = 2$.