MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

Assignment 5

MATHEMATICS 1001

Fall 2025

Due: Wednesday, November 5th, 2025 at 6:00pm. Show all work. See the Gradescope Handout for submission information.

Note: You should complete the WeBWorK problem sets "The Fundamental Theorem 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 Fundamental Theorem of Calculus to find f'(x), given

$$f(x) = \int_{6x}^{x^6} \sec(t^2) \, dt.$$

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

(a)
$$\int_{\frac{1}{4}}^{4} \frac{\cos(\pi\sqrt{x})}{\sqrt{x}} dx$$

(b)
$$\int_{-1}^{3} |5t - 2| dt$$

(c)
$$\int_0^{\frac{\pi}{3}} \sec^2(x) \tan(x) e^{\sec(x)} dx$$

3. Use the Fundamental Theorem of Calculus to find the area of the region which lies under the curve $f(x) = \frac{1}{16x^2 - 8x + 5}$ and between the lines $x = \frac{1}{4}$ and $x = \frac{3}{4}$.