

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

## DEPARTMENT OF MATHEMATICS AND STATISTICS

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ASSIGNMENT 4

MATHEMATICS 1001

WINTER 2025

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**Due: Monday, March 3rd, 2025 at 11:59pm.** See the Gradescope Handout for submission information.

**Note:** You should complete Worksheet 2.1 and Worksheet 2.2 before you work on this assignment.

1. Use the limit of a Riemann sum to determine the area  $A$  of each of the following regions. (In each case, use a regular partition and let the sample point  $x_i^* = x_i$ , that is, the right endpoint of the  $i$ th subinterval.)
  - (a) The region under the curve  $f(x) = (x - 4)^2$  on the interval  $[-2, 4]$ .
  - (b) The region under the curve  $f(x) = x^3 + x^2 + x + 1$  on the interval  $[-1, 1]$ .
2. Consider the line  $y = mx + b$  for any  $m < 0$  and  $b > 0$ . Together with the  $x$ - and  $y$ -axes, the graph of this line forms a right triangle. Use the limit of a Riemann sum to show that the area of this triangle is given by  $A = -\frac{b^2}{2m}$ .
3. Evaluate  $\int_0^{\frac{3}{2}} 2x(4 - 3x) dx$  by computing the limit of a Riemann sum.