MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 7 **MATHEMATICS 1001** WINTER 2025

Due: Wednesday, March 27th at 11:59pm. See the Gradescope Handout for submission information.

> **Note:** You should complete the WeBWorK problem sets "Integrals by Partial Fractions' and "Trigonometric Integrals", as well as Worksheets 3.1, 3.2, 3.3 and 3.4, before you work on this assignment.

1. Evaluate each of the following integrals using the indicated technique. (Additional techniques may also be required.)

   (a) $\displaystyle\int \frac{13x^2 - 4x - 12}{4x^3 + 4x^2 + 16x + 16}\,dx,$ partial fractions

   (b) $\displaystyle\int \sin^6(x)\cos^5(x)\,dx,$ trigonometric integration strategies

   (c) $\displaystyle\int \frac{1}{x\sqrt{x^2+9}}\,dx,$ trigonometric substitution

   (d) $\displaystyle\int_1^{\sqrt{2}} \frac{x^2}{\sqrt{4-x^2}}\,dx,$ trigonometric substitution

2. Evaluate the improper integral

$$\int_0^2 \ln\left(\frac{x}{2}\right)\,dx$$

   or show that it is divergent.