

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 7

MATHEMATICS 1001

WINTER 2024

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

Note: You should complete the WebAssign problem sets “Integrals by Partial Fractions”, “Trigonometric Integrals”, “Integrals by Trigonometric Substitution” and “Integration Strategies”, as well as Worksheet 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) $\int \frac{2x^2 - 4x - 1}{3x^3 + x^2 + 3x + 1} dx$, partial fractions

(b) $\int \frac{\cos^5(3x)}{\sin^4(3x)} dx$, trigonometric integration strategies

(c) $\int \frac{\sqrt{x^2 - 25}}{x^3} dx$, trigonometric substitution

(d) $\int_0^{2\sqrt{2}} \frac{x}{\sqrt{16 - x^2}} dx$, trigonometric substitution

2. Evaluate the improper integral

$$\int_{-\infty}^0 x^2 e^{4x} dx$$

or show that it is divergent.