

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

TEST 2

MATHEMATICS 1001-004

MARCH 22ND, 2024

Name

MUN Number

- [7] 1. (a) Use the definition of the definite integral as a limit of a sum to evaluate

$$\int_{-1}^1 (6x^2 - x + 2) dx.$$

- [3] (b) Check your answer to part (a) using the Fundamental Theorem of Calculus.

[15] 2. Evaluate each of the following definite integrals.

(a) $\int_0^3 \frac{x^2 + 4}{x^2 + 9} dx$

(b) $\int_0^4 \frac{3x}{\sqrt{x^2 + 9}} dx$

(c) $\int_{-\frac{1}{2}}^2 f(x) dx$ where $f(x) = \begin{cases} e^{2x}, & \text{for } x < 0 \\ \cos(\pi x), & \text{for } 0 \leq x < 1 \\ -\frac{1}{x^2}, & \text{for } x \geq 1 \end{cases}$

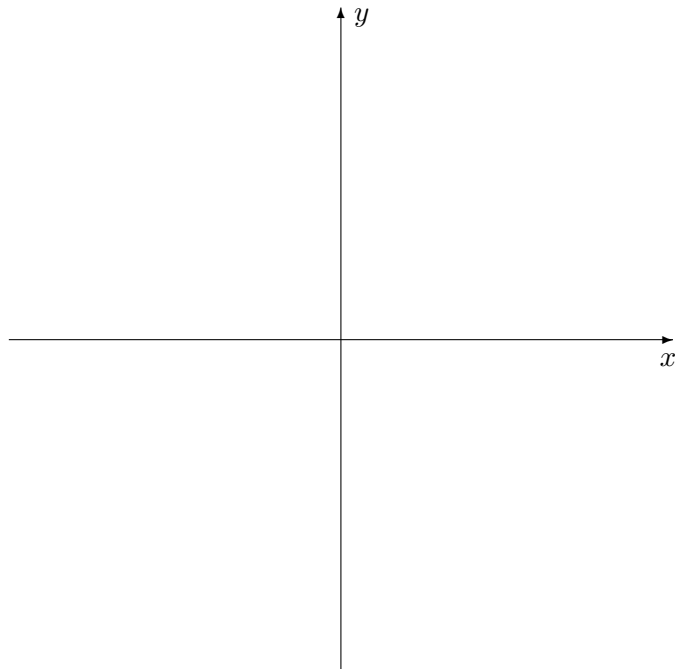
- [5] 3. Consider the function

$$g(x) = \int_{x^2}^x t^2 \cos(t^4) dt.$$

Find and simplify $g'(x)$.

- [10] 4. Consider the region R bounded by the curves $y = 2 - \frac{1}{2}x$, $y = \sqrt{x-1}$ and the x -axis.

(a) Sketch the graph of the region R on the axes provided.



(b) Set up, but **DO NOT EVALUATE**, an integral (or a sum of integrals) with respect to x which represents the area of R .

(c) Set up, but **DO NOT EVALUATE**, an integral (or a sum of integrals) with respect to y which represents the area of R .