MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

TEST 2 **MATHEMATICS 1001-002** 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) $\displaystyle\int_0^3 \frac{x^2+4}{x^2+9}\,dx$

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

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

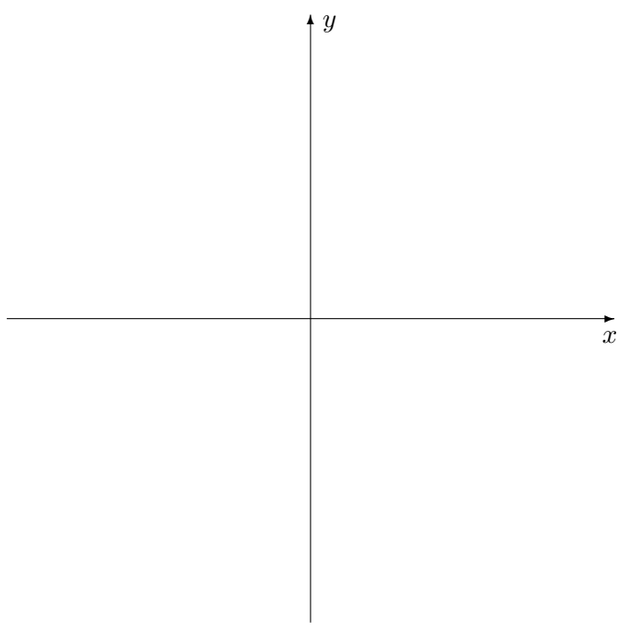
[5] 3. Consider the function

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

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.

[40]