MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

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TEST 2 **MATHEMATICS 1001-001** March 26th, 2025

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| **Name** | **MUN Number** |
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[7] 1. (a) Use the definition of the definite integral as a limit of a sum to evaluate

$$\int_{-1}^{4} (4 + 3x - x^2)\, dx.$$

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

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

(a) $\displaystyle\int_1^2 \frac{\ln(x)}{x^3}\,dx$

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

(c) $\displaystyle\int_{-3}^{3} |2-x|\,dx$

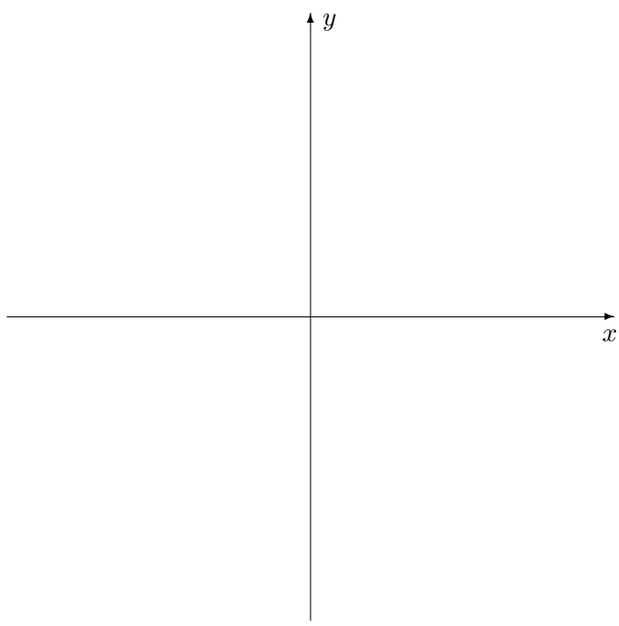
[5] 3. Consider the function

$$g(x) = \int_{x}^{\sin(x)} t\sqrt{t^3+1}\,dt.$$

Find and simplify $g'(x)$.

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

(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]