



Name: _____

Mark:
25

MATH 101 (Winter, 2023)
Test 2A

1. (4 marks) Evaluate the limit $\lim_{x \rightarrow 0} \frac{\sin 3x^2}{1 - \cos 7x}$.

2. (4 marks) Write the improper integral in the form of a limit and then evaluate it, or if it diverges, then determine whether it diverges to ∞ , $-\infty$, or neither.

$$\int_0^1 \frac{e^{1/x}}{x^2} dx$$

3. Find the following integrals.

(a) (3 marks) $\int x^4 \ln x \, dx$

(b) (4 marks) $\int \frac{x^2 + 6}{x(x^2 + 9)} \, dx$

4. (5 marks) Use a trigonometric substitution to evaluate the integral $\int_0^1 \frac{x^2}{\sqrt{4-x^2}} dx$.

5. (5 marks) Each end of a tank is in the shape of the parabolic region bounded by $y = x^2$ and $y = 4$, where x and y are measured in meters, as illustrated. If the tank is full of light crude oil weighing $8,100 \text{ N/m}^3$, then how much force does the oil exert on each end of the tank?

