

Midterm #1

MATH 126-101 — Calculus II

Thursday, Sept 24, 2026

Please print your name:

No notes, graphing calculators or other tools are permitted. There are 30 points in total. You need to show work to receive full credit.

Good luck!

Problem 1. (3 points) Evaluate the following indefinite integrals.

(a) $\int \cos(3x) \, dx =$

(b) $\int \frac{1}{4x} \, dx =$

(c) $\int \sqrt{x} \, dx =$

Problem 2. (5 points) Consider the region in the first quadrant bounded by the curves $y = x^2$ and $y = x$. Use the shell method to find the volume of the solid generated by revolving this region about the y -axis.

Problem 3. (2 points) Set up an integral (but do not evaluate it) for the length of the curve $y = e^{2x}$ for $0 \leq x \leq 1$.

Problem 4. (5 points) Solve the initial value problem $\frac{dy}{dx} = y^2$, $y(2) = 1$.

Problem 5. (5 points) Evaluate the following indefinite integral: $\int \cos(3t)\sin^4(3t)dt$

Problem 6. (5 points) Evaluate the integral $\int_0^4 \frac{x}{\sqrt{x^2+9}} dx$.

Problem 7. (5 points) A conical container of radius 20 ft and height 40 ft is completely filled with brine (the tip of the cone is at the bottom). Brine weighs 75 lb/ft³. Write down an integral for how much work it will take to pump the water to a level of 3 ft above the cone's rim. Do not evaluate the integral.

(extra scratch paper)