

Midterm #2, 3/27
Math 157 (Calculus II), Spring 2024

Each problem is worth 10 points, for a total of 50 points. You have 50 minutes to do the exam. Remember to *show your work* on all problems!

1. Write, **but do not attempt to evaluate**, a definite integral which computes the arc length of the curve $y = xe^x$ from $x = 0$ to $x = 1$.
2. Compute the surface area of the surface obtained by rotating the curve $y = \sqrt{1 - x^2}$ from $x = 0$ to $x = \frac{1}{2}$ about the x -axis.
3. Consider the parametrized curve given by $x = t^2 - 1$ and $y = t^3 + t$ for $-\infty < t < \infty$. Compute the slope of the tangent to this curve at the point $(x, y) = (0, 2)$.
4. Consider the polar curve given by $r = \sqrt{\theta(\pi - 2\theta)}$ for $0 \leq \theta \leq \frac{\pi}{2}$. Compute the area inside of this curve.
5. Consider the polar curve given by $r = \sin(\theta) + \cos(\theta)$ for $0 \leq \theta \leq \pi$. Compute the slope of the tangent to this curve (i.e., $\frac{dy}{dx}$) when $\theta = 0$.