# Midterm #1, 3/2
# Math 157 (Calculus II), Spring 2023

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. Let $R$ be the region under the curve $y = x^2$ from $x = 0$ to $x = 1$.
   (a) Compute the volume of the solid obtained by rotating $R$ about the $x$-axis.
   (b) Compute the volume of the solid obtained by rotating $R$ about the $y$-axis.
2. Compute the indefinite integral $\int (x^2 + 2x + 1)\, e^x \, dx$. (**Hint**: try integration by parts.)
3. Compute the definite integral $\displaystyle\int_0^2 \frac{1}{4 + x^2}\, dx$. (**Hint**: try a trigonometric substitution.) Express your answer in the simplest form you can.
4. Compute the indefinite integral $\displaystyle\int \frac{x + 1}{x^2 - 4}\, dx$. (**Hint**: try partial fractions.)
5. 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.