1. Compute the derivative of \( F(x) := \int_{x^2}^{0} \ln(1 + t) \, dt \)

2. Determine each of the following integrals:
   (a) \( \int (3 - 2x)^5 \, dx \)
   (b) \( \int xe^{-x^2} \, dx \)
   (c) \( \int \frac{e^{2x}}{e^x + 1} \, dx \)

3. (a) Express \( x^{(x^2+1)} \) in terms of the \( \ln \) and \( \exp \) functions.
   (b) Differentiate \( x^{(x^2+1)} \).

4. (a) Sketch a graph of the region bounded by the curves \( y = x^2 \) and \( x = y - 2 \).
   (b) Determine the area of the specified region.

5. Using the Disk/Washer method, determine the volume of revolution, about the \( x \)-axis, of the region bounded by the curves \( y = x^2 \) and \( x = y - 2 \).

6. Using the Cylindrical Shell method, determine the volume of revolution about the \( y \)-axis of the region in the first quadrant which is bounded by the curves \( y = x^2 \) and \( x = y - 2 \).

7. Determine the arc length of the curve given by the graph of \( y = \frac{1}{3} (x^2 + 2)^{3/2} \) for \( x = 0 \) to \( x = 1 \).