1. (20 marks)
   (a) (5 marks) Find the derivative \( \frac{dF}{dx} \) of the function:
   \[
   F(x) = \int_{\cos(x)}^{x} \sin(t) \, dt.
   \]
   (b) (5 marks) Use the Trapezoidal Rule to approximate
   \[
   \int_{0}^{6} (x - 2)^2 \, dx
   \]
   with \( n = 3 \) equal subintervals. **Simplify your answer.**
   (c) (5 marks) Evaluate the indefinite integral:
   \[
   \int \cos^5(x) \, dx.
   \]
   (d) (5 marks) Compute the Midpoint Riemann sum for the function \( f(x) = x^2 \) on the interval \([-5, 5]\) using \( n = 5 \) equal subintervals. **Simplify your answer.**

2. (10 marks) Evaluate the following indefinite integral:
   \[
   \int \frac{\sqrt{x^2 - 2x - 8}}{x - 1} \, dx.
   \]

3. (10 marks) Find the solution of the initial value problem:
   \[
   \frac{dy}{dt} e^{-y} - \frac{\ln(t)}{t} = 0, \quad y(1) = 0.
   \]
   **You may leave the answer in its implicit form.**

4. (10 marks) Evaluate the definite integral:
   \[
   \int_{0}^{8} \frac{x^3 - 6x^2 - 2x - 11}{x^2 - 6x - 7} \, dx.
   \]