MATH 172 PROBLEM SET 3

1. Find the following integrals:
   a. \( \int \frac{x+1}{e^x} \, dx \)
   b. \( \int \frac{3}{\sqrt[3]{x}} \ln(x^5) \, dx \)
   c. \( \int (x - e^{-x})^2 \, dx \)
   d. \( \int 2(x - 1) \ln(x - 1) \, dx \)
   e. \( \int \frac{\ln(x+1)}{\sqrt{x+1}} \, dx \)
   f. \( \int (\ln x)^3 \, dx \)

2. Find the following integrals:
   a. \( \int \frac{14x^3 + 24x}{(x^2 + 1)(x^2 + 2)} \, dx \)
   b. \( \int \frac{2x^2 - 5x - 2}{(x - 2)^2(x - 1)} \, dx \)
   c. \( \int \frac{5x^4 + 9x^2 + 3}{x(x^2 + 1)^2} \, dx \)
   d. \( \int \frac{5x^2 + 2}{x^3 + x} \, dx \)

3. Find the area of the region bounded by the x-axis and the curve \( y = x^5 e^x \) between \( x = 0 \) and \( x = 1 \).

4. If the cost function is given by \( c = 4000 + 10q + 0.1q^2 \), find the average cost on the interval from \( q = 100 \) to \( q = 500 \).

5. Find the area of the region bounded by the x-axis and the curve \( y = x^5 e^x \) between \( x = 0 \) and \( x = 1 \).

6. Find the area under the curve \( y = x^5 e^x \) from \( x = 0 \) to \( x = 1 \).