1. Find the following indefinite integrals:

(a) \( \int (4x^3 + 1) \, dx \)

(b) \( \int (5e^x + \frac{6}{x}) \, dx \)

(c) \( \int (x^{-2} - \frac{1}{\sqrt{x}}) \, dx \)

(d) \( \int \frac{x}{4x^2 - 9} \, dx \)

(e) \( \int xe^{2x+2} \, dx \)

(f) \( \int \frac{(\ln x)^3}{x} \, dx \)
2. Find the following definite integrals:

(a) \( \int_{0}^{2} (3x^2 + 6x + 7) \, dx \)

(b) \( \int_{0}^{1} x^2 e^{2x^3 + 1} \, dx \)

(c) \( \int_{1}^{3} \frac{x^2}{x^3 + 1} \, dx \)

3. Suppose that the daily fixed cost of a company is $400 and that its daily marginal cost function is \( C'(x) = -0.25x + 40, \quad 0 \leq x \leq 160 \), where \( C'(x) \) is measured in dollars/unit and \( x \) denotes the number of units produced. Find the cost function of the company.

4. Find the area of the region bounded by the graphs of the functions \( f(x) = e^{2x} \) and \( g(x) = x \) and the vertical lines \( x = -1 \) and \( x = 2 \).
5. Find the area of the region completely enclosed by the graphs of the given functions \( f = x + 2 \) and \( g = x^2 - 4 \).

6. The temperature (in °F) in Charlotte over a 12-hr period on a certain August day was given by

\[
T = 75 + 0.25t\sqrt{144 - t^2}, \quad (0 \leq t \leq 12),
\]

where \( t \) is measured in hours, with \( t = 0 \) corresponding to 9 a.m. Determine the average temperature on that day over the 12-hr period from 9 a.m. to 9 p.m.