1) Find the extreme of \( f(x, y, z) = x - y + z \) subject to the constraint \( x^2 + y^2 + z^2 = 2 \).

2) Find the extreme of \( f(x, y) = 3x + 2y \) subject to the constraint \( 2x^2 + 3y^2 = 3 \).

3) Find the extreme values of \( f = xy \) subject to the constraint \( g = x^2 + y^2 - 10 = 0 \).

4) Minimize the function \( f(x, y) = x^2 + y^2 - xy \) subject to the constraint \( x + 2y - 14 = 0 \).

5) Use the method of Lagrange multipliers to maximize the function \( f(x, y) = 2x + 3y - x^2 - y^2 \) subject to the constraint \( x + 2y = 9 \).
7) Evaluate the iterated integral
\[ \int_0^4 \int_y^{1/2} y^2 \, dx \, dy \]

8) Evaluate the double integral
\[ \iint_D \frac{y}{x^5 + 1} \, dA \quad D = \left\{ (x,y) \mid 0 \leq x \leq 1, \quad 0 \leq y \leq x^2 \right\} \]

9) Evaluate the double integral
\[ \iint_D (x^2 + 2y) \, dA \quad D \text{ is bounded by } y = x, \quad y = x^3, \quad x > 0 \]

10) Find
\[ \int_0^1 \int_{e^x}^{x^2} e^{\frac{y}{x}} \, dy \, dx \]

11) Evaluate the double integral
\[ \iint_D y^2 \, dA \quad D \text{ is the triangular region with vertices } (0,1), \quad (1,2), \quad (4,1) \]