1. Find the area of the region bounded by the graphs of \( y = x^2 - 4x + 3 \) and \( y = -x^2 + 2x + 3 \).

2. Find \( dy/dx \) given that \( x \ln y + y \ln x = 3 \).

3. Compute the integral \( \int \frac{dx}{x(x-4)} \).

4. Find the sum of the series \( \sum_{n=1}^{\infty} \left[ \frac{1}{2^n} - \frac{1}{n(n+1)} \right] \).

5. Evaluate the integral \( \int_0^\pi \int_0^\infty (x+2z) \ dy \ dz \).

6. Find the values of \( a \) and \( b \) such that \( \lim_{x \to 0} \frac{a - \cos bx}{x^2} = 2 \).

7. Find the tangent line to the graph \( x^2 + 4y^2 = 4 \) at the point \( (\sqrt{2},-\sqrt{2}) \).

8. Find the arc length of the graph of \( y = \ln(\cos x) \) from \( x = 0 \) to \( x = \pi/4 \).

9. Find \( \partial_z \partial_x \) and \( \partial_z \partial_y \) for \( 3x^2z-x'y^2+2z^2+3yz-5 = 0 \).

10. Sketch the region of integration and then evaluate the iterated integral \( \int_0^4 \int_0^1 \sqrt{x} \sin x \ dx \ dy \).