1. Determine the long-term growth rate and percentage age distribution for a population of female birds with Leslie matrix \( L = \begin{bmatrix} 1 & 4 \\ 0 & 2 \end{bmatrix} \).

2. Find the Taylor polynomial \( P_3(x) \) for \( f(x) = \sqrt{x+3} \) centered at \( a = 1 \).

3. Find an equation for the plane which passes through the point \( P(6,5,-3) \) and is perpendicular to the vector \( \vec{v} = \langle 5, -2, 4 \rangle \).

4. Find the following indefinite integrals:
   a) \( \int \frac{1}{x(1+\ln x)} \, dx \)
   b) \( \int e^{2x} \sin x \, dx \)
   c) \( \int \frac{(x+1)^3}{x^4(x-1)} \, dx \)

5. Solve the following differential equations:
   a) \( \frac{dy}{dx} + y = \frac{1}{1 + e^{2x}} \)
   b) \( \frac{dy}{dx} - y^3 x e^x = 0 \)

6. Find an equation of the plane which passes through the points \( P(1,2,-3) \), \( Q(1,1,1) \), and \( R(-3,-2,1) \).

7. Find the parametric equations for the line which passes through the point \( P(2,3,4) \) and is perpendicular to the plane \( x - y - z = 0 \).

8. Use the comparison test to determine if the integral \( \int_1^3 \frac{3}{\sqrt{x^2 + 4x - 2}} \, dx \) converges or diverges.

9. Let \( A \) be a matrix with eigenvalues \( \lambda_1 = 2 \) and \( \lambda_2 = -3 \) and corresponding eigenvectors \( v_1 = \begin{bmatrix} 1 \\ -3 \end{bmatrix} \) and \( v_2 = \begin{bmatrix} 2 \\ 1 \end{bmatrix} \). Find \( A^3 \). 

10. Find the area of the region bounded by the graphs of \( y = x \), \( y = 1 \), and \( y = \frac{1}{4x} \).

11. Find \( \int \frac{x e^{2x}}{(2x+1)^2} \, dx \).

12. Evaluate \( \int_0^4 \frac{12x}{13x+1} \, dx \).