每題 10 分，共 100 分

1. Find the limit \( \lim_{{x \to 0}} \frac{\sqrt{x+1} - 1}{x} \).

2. Find the extrema of \( f(x) = 2x - 3x^{2/3} \) on the interval \([-1, 3]\).

3. Find the area of the region bounded by the graphs of \( f(x) = 2 - x^2 \) and \( g(x) = x \).

4. Find the arc length of the graph of \( y = \frac{x^3}{6} + \frac{1}{2x} \).

5. Find the interval of convergence of \( \sum_{n=1}^{\infty} \frac{x^n}{n^2} \).

6. Find the extrema of \( f(x) = \frac{x^2}{x^2 + 3} \) on the interval \([-1, 1]\).

7. Find an equation of the tangent line to the graph \( y^2(x^2 + y^2) = 2x^2 \) at point \((1, 1)\).

8. Evaluate \( \int \frac{1 - \ln(x^2)}{x} \, dx \).

9. Find the interval of convergence of \( \int f(x) \, dx \), where \( f(x) = \sum_{n=1}^{\infty} \frac{(-1)^{n+1}(x-4)^n}{n9^n} \).

10. Find the directional derivative of the function \( f(x, y, z) = y^2 + xz \) at point \( P(1, 2, 2) \) in the direction of \( \vec{Q}(3, 1, 4) \).