

Evaluate the following integrals:

1. (10 points)

$$\int \ln(x^2 - 1) dx$$

2. (10 points)

$$\int \sin^2 x \cos \frac{5}{2} x dx$$

3. (10 points)

$$\int \tan^3 x \sqrt{\sec x} dx$$

4. (10 points)

$$\int_0^1 \sqrt{3-2x-x^2} dx$$

5. (10 points). Test for convergence.

$$\int_1^{\infty} \frac{x-1}{2x^2 + \sqrt[3]{x^2+5}} dx$$

6. (10 points). Solve the differential equation $(x^5 + 1)y' = x^4(y^2 - y - 2)$.