

Practice Final I

1. Evaluate the integrals $\int x^2 e^x dx$ and $\int x e^{x^2} dx$.
2. Use the method of partial fractions to evaluate the integral:

$$\int \frac{4x^2 - 6}{x^3 - x^2 - 6x} dx.$$

3. Use the ratio test to investigate the convergence or divergence of the series

$$\sum_{n=0}^{\infty} \frac{n!}{n^n}.$$

What can you conclude?

4. Let $f(x)$ be the function of x defined by the formula

$$f(x) = -\log |1 - x|.$$

Determine a power series representation for $f(x)$.

5. Determine all values of p for which the following series converges and all values of p for which the series following series diverges:

$$\sum_{n=0}^{\infty} \frac{n^5}{(n+1)^p}.$$