

Sample problems for the Advanced Placement exam for MATH 1552

1. Evaluate

$$\int e^{7\theta} \sin 3\theta \, d\theta, \quad \int_0^{\pi/9} x \tan^2(3x) \, dx, \quad \int \frac{y^2 + 18y + 81}{(y^2 + 81)^2} \, dy.$$

2. Evaluate

$$\lim_{x \rightarrow \infty} \frac{\ln x}{\sqrt{x}}.$$

3. Consider the series

$$\sum_{n=2}^{\infty} \frac{x^n}{n(\ln n)^2}.$$

Find the series' radius and interval of convergence. For what values of x does the series converge absolutely? For what values of x does the series converge conditionally?