

SAMPLE TEST FOR MATH10 FINAL

Time: 3 hours, do all the problems.

1. Evaluate the integral

$$\int \tan x \sec^4 x dx$$

2. Find the length of the curve

$$y = \frac{1}{6}x^3 + \frac{1}{2x}, \quad \text{for } 1 \leq x \leq 2$$

3. Solve the following differential equation with the given initial condition

$$y' = xy(y + 1), \quad y(0) = 1$$

4. Determine the following series is absolutely convergent, conditionally convergent or divergent,

$$\sum_{n=1}^{\infty} \left(\frac{\sin n}{n} \right)^3$$

5. Determine whether the following series converges or diverges,

$$\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$$

6. Find the radius of convergence and interval of convergence of the series

$$\sum_{n=1}^{\infty} x^{n^2}$$

7. Find a power series representation for $\ln(1 + x)$, find the radius of convergence and interval of convergence of that series.

8. Find the Maclaurin series for

$$\frac{1}{x} \sin(2x^2)$$

9. Use the Maclaurin series of e^x to find the value of $e^{-1/10}$, correct to 0.01.

10. Find the Taylor series for $f(x) = 1/x$, centered at $a = -1$.