

MATH 222 — SECOND MIDTERM

March 11, 2002, 9:55am–10:45am

Your Name:

Your TA: (circle one)

Chris Alfeld

Graham Jonaitis

Andy Raich

Joshua Rushton

Fernando Miranda

Score

1:

2:

3:

4:

5:

Total:

2

- (1) Show how you can use the integral test to decide whether or not the series $\sum_{k=2}^{\infty} \frac{1}{k \ln k}$ converges.

(2) Compute the radius of convergence of the series

$$\sum_{k=0}^{\infty} \frac{k+1}{3^k} x^{2k} = 1 + \frac{2}{3}x^2 + \frac{3}{9}x^4 + \frac{4}{27}x^6 + \cdots$$

4

- (3) Find the term containing x^{13} in the Taylor-Maclaurin series of $f(x) = \cos(x + \pi/6)$.

(4) If one replaces

$$f(x) = \ln(5 + x)$$

by

$$f(x) \approx \ln 5 + \frac{1}{5}x - \frac{1}{50}x^2,$$

then give an estimate for the error one makes, provided $|x| < 0.1$.

6

(5) Find the general solution to the differential equation

$$(1 + x)\frac{dy}{dx} = y^2.$$