Math 104-001 **Exam 3** **Rimmer**
Fall 2016

1. Find the limit of the sequence

$$a_n = \left\{ \left(\frac{n}{n-2} \right)^{\frac{n}{2}} \right\}$$

(A) e^{-1} (C) e^{2} (E) e (G) $\sqrt{e}$

(B) 0 (D) 1 (F) ∞ (H) None of these

2. Determine whether the following series converges or diverges. If it converges, find its sum.

$$\sum_{n=1}^{\infty} 3^{n+1} 4^{-n}$$

(A) 9 (C) 3 (E) 2 (G) 1

(B) 6 (D) $\frac{9}{4}$ (F) 8 (H) The series diverges

3. Determine whether the following series converges or diverges.

I. $\displaystyle\sum_{n=1}^{\infty} \frac{n(2n+3)}{(n^2+1)(3n+5)(n+11)}$ II. $\displaystyle\sum_{n=1}^{\infty} (n)^{\frac{1}{n}}$ III. $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^{5/3}}$

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

I. $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n}{n^{e/\pi}}$ II. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n \ln n}{n^{7/4}}$

5. Find the interval of convergence of the power series

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

6. Find the cubic Taylor polynomial for $f(x) = \ln x$ centered at $x = 1$.
Use it to approximate $\ln 2$.
In other words, if the cubic is called $T_3(x)$, then find $T_3(2)$.

(A) 2 (C) $\frac{1}{3}$ (E) $\frac{1}{4}$ (G) $\frac{1}{2}$

(B) $\frac{5}{6}$ (D) $\frac{2}{3}$ (F) 1 (H) e

7. Using the list of known Maclaurin series, find the coefficient on x^4 in the Maclaurin series for

$$\int e^{2x} \arctan x \, dx$$

(A) $\frac{1}{2}$ (C) $\frac{1}{3}$ (E) $\frac{1}{4}$ (G) $\frac{2}{3}$

(B) $\frac{5}{6}$ (D) $\frac{7}{6}$ (F) $\frac{7}{12}$ (H) $\frac{5}{12}$

ANSWERS:

1. E
2. A
3. I. Converge by Limit Comp.Test, II. Diverge by Test for Divergence III. Converge by Integral Test
4. I. Conditionally Convergent, II. Absolutely Convergent
5. [0,2]
6. B
7. H