Unit: Sequence and Series Date: _____

Topic: Sequences and Series Review

Objective: SWBAT repair skills needed to successfully complete exam on sequences and series.

Directions: Read each question carefully and show all work. NO CALCULATOR

1. Find the nth term, rule of sequence, and use it to determine whether or not the sequence converges.

   $2, \frac{3}{4}, \frac{4}{9}, \frac{5}{16}, \frac{6}{25}, \ldots.$

2. Which of the following series converge?

   I. $\sum_{k=3}^{\infty} \frac{2}{k^2+1}$ II. $\sum_{k=1}^{\infty} \frac{3n!}{2^n}$ III. $\sum_{k=1}^{\infty} \frac{2^n+3}{5^n}$

   (A) none (B) II only (C) III only (D) I and III (E) II and III

3. Which of the following series diverge?

   I. $\sum_{k=1}^{\infty} \left(\frac{6}{7}\right)^k$ II. $\sum_{k=1}^{\infty} \frac{4}{5n}$ III. $\sum_{k=2}^{\infty} \frac{(-1)^k}{k}$

   (A) none (B) II only (C) III only (D) I and III (E) II and III

4. What is the sum of $\sum_{n=1}^{\infty}\left(\frac{1}{n+1}-\frac{1}{n+3}\right)$

5. Determine if the series converges or diverges. If possible, state the value to which it converges.

a) $3+\frac{9}{4}+\frac{27}{16}+\frac{81}{64}+\cdots$

b) $\sum_{n=1}^{\infty} 2n^{-1/3}$

6. Use the indicated test for convergence to determine if the series converges or diverges.

a) Ratio Test: $\sum_{n=1}^{\infty}\frac{n^3}{n!}$

b) Comparison Test: $\sum_{n=1}^{\infty} \frac{5^n}{8^n+1}$

c) Comparison Test: $\sum_{n=1}^{\infty} \frac{\sqrt{n^4+1}}{5n^3}$

d) Integral Test: $\sum_{n=1}^{\infty} \frac{3n}{2n^2+3}$

7. Determine whether or not the series converges or diverges using an appropriate convergence test (there may be more than one applicable test). State the test used.

a) $\sum_{n=1}^{\infty} \frac{1+3n^2+n^3}{4n^3-5n+2}$

b) $\sum_{n=1}^{\infty} \frac{n!}{2n!+1}$

c) $\sum_{n=1}^{\infty} \frac{cosn}{n^3}$

d) $\sum_{n=1}^{\infty} \frac{1}{\sqrt[3]{n^5+5}}$

e) $\sum_{n=1}^{\infty} \frac{n^2}{5^n}$

f) $\sum_{n=1}^{\infty} \frac{\left(1+\frac{1}{n}\right)^n}{n^2+1}$

g) $\sum_{n=2}^{\infty} \frac{1}{nln^5n}$

h) $\sum_{n=1}^{\infty} \sqrt{\frac{3n+1}{n^5+2}}$

8. Given: $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt[5]{3n+4}}$

a) Does the alternating series given converge or diverge? If it converges, does it converge absolutely or conditionally?

b) If the first six terms are used to approximate the sum, what is the error estimate on this approximation?

Answer Key

1) Converges	2) D
3) B	4) 5/6
5) a) Converges to 12	b) Diverges
6) a) Converges	b) Converges
c) Diverges	d) Diverges
7) a) Diverges	b) Diverges
c) Converges	d) Converges
e) Converges	f) Converges
g) Converges	h) Converges
8) a) Conditionally convergent	b) $< -\frac{1}{\sqrt[5]{25}}$