

Name: \_\_\_\_\_

Math 231 W3, Spring Semester 2008  
Mock Exam # 2  
March 7, 2008

**Problem 1: State whether the following sequences converge or diverge. Find the limit of each sequence that converges. (Show your work!)**

(a)  $\left\{ \frac{n^2 - 2n}{n^3 + 17n^2} \right\}_{n=1}^{\infty}$

(b)  $\left\{ \left( -\frac{1}{2} \right)^n \right\}_{n=1}^{\infty}$

(c)  $\left\{ \frac{n^2}{\ln n} \right\}_{n=2}^{\infty}$

(d)  $\{e^{1/n}\}_{n=1}^{\infty}$

**Problem 2:** Determine whether the following series converge or diverge. For those that converge, determine the sum.

$$(a) \sum_{k=3}^{\infty} \frac{1}{k^2 - k}$$

$$(b) \sum_{k=0}^{\infty} \frac{1 - 2^k}{3^k}$$

$$(c) \sum_{k=1}^{\infty} \frac{3^{2k-1}}{4^{k+1}}$$

$$(d) \sum_{k=0}^{\infty} (-1)^k \frac{k}{k+1}$$

**Problem 3:** Determine whether or not the following series converge. Show your work—state any tests you use.

$$(a) \sum_{k=2}^{\infty} \frac{k}{k^2 - 1}$$

$$(b) \sum_{k=1}^{\infty} \frac{\ln k}{k}$$

$$(c) \sum_{k=1}^{\infty} \frac{2k + 5}{5k^3 - 3k^2}$$

$$(d) \sum_{k=1}^{\infty} \frac{1}{k2^k}$$

**Problem 4:** Determine whether or not the following series converge. Show your work—state any tests you use.

$$(a) \sum_{k=1}^{\infty} \frac{2^k}{k^k}$$

$$(b) \sum_{k=1}^{\infty} (-1)^{k+1} \frac{1}{\sqrt{k}}$$

$$(c) \sum_{k=1}^{\infty} \frac{k^2}{e^k}$$

$$(d) \sum_{k=2}^{\infty} \frac{k^2 + 1}{2k^2 - 3}$$

**Problem 5:** For each of the series below, state whether the series converges absolutely, converges conditionally, or diverges:

$$(a) \sum_{k=1}^{\infty} \frac{(-1)^k k}{2^k} \qquad (b) \sum_{k=2}^{\infty} \frac{(-1)^k}{\ln k}$$

