MATH 22 PRACTICE EXAM ON ROOT AND RATIO TESTS 11.6

Name:

Section:

Instructions:

(1) Books, notes, and calculators are not permitted.
(2) Simplify as instructed. On some problems, unsimplified correct answers will not receive full credit.
(3) Show your work as instructed. On some problems, correct answers without justification will not receive full credit.

(1)

(2)

(3)

(4)

(5)

Total

Problem 1. (5 pts.) Circle the correct answer. There will be no partial credit. You do not need to show your work.

Consider the harmonic series

$$\sum_{n=1}^{\infty} \frac{1}{n},$$

which diverges. What do the Ratio Test and Root Test tell us about the series? You may use the fact that $\lim_{n\to\infty} \sqrt[n]{n} = 1$.

A. Both tests say that the series diverges.

B. The Ratio Test says that the series diverges; the Root Test gives no information.

C. The Root Test says that the series diverges; the Ratio Test gives no information.

D. Both tests give no information.

E. None of these.

Problem 2. (5 pts.) Circle the correct answer. There will be no partial credit. You do not need to show your work.

Consider the geometric series

$$\sum_{n=0}^{\infty} \left(-\frac{1}{2}\right)^n,$$

which converges. What do the Ratio Test and Root Test tell us about the series?

A. Both tests say that the series converges.

B. The Ratio Test says that the series converges; the Root Test gives no information.

C. The Root Test says that the series converges; the Ratio Test gives no information.

D. Both tests give no information.

E. None of these.

Problem 3. (5 pts.) Circle the correct answer. There will be no partial credit. You do not need to show your work.

Suppose that the series

$$\sum_{n=0}^{\infty} a_n$$

has only positive terms and consider the following statements.

I. The series diverges to ∞.
II. The series diverges, but not to ∞.
III. The series converges absolutely to a positive number.
IV. The series converges conditionally to a positive number.

Which of the statements could possibly be true?

A. I only.

B. I and II only.

C. I and III only.

D. I and IV only.

E. None of these.

Problem 4. (5 pts.) Circle the correct answer. There will be no partial credit. You do not need to show your work.

Let $(a_0, a_1, a_2, \dots)$ be a sequence satisfying $\lim_{n\to\infty} a_n = 0$ and suppose that

$$\sum_{n=0}^{\infty} |a_n|$$

diverges to ∞. What can we conclude about the series

$$\sum_{n=0}^{\infty} a_n \, ?$$

A. It certainly diverges.

B. It diverges or it converges conditionally.

C. It diverges or it converges absolutely.

D. It converges conditionally or it converges absolutely.

E. None of these.

Problem 5. (15 pts.)

Decide if the series

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

diverges, converges conditionally, or converges absolutely. Explain your reasoning.

Problem 6. (15 pts.)

Decide if the series

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

diverges, converges conditionally, or converges absolutely. Explain your reasoning.

Problem 7. (15 pts.)

Decide if the series

$$\sum_{n=1}^{\infty} \frac{(-9)^n}{n10^{n+1}}$$

diverges, converges conditionally, or converges absolutely. Explain your reasoning.

Problem 8. (15 pts.)

Decide if the series

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

diverges, converges conditionally, or converges absolutely. Explain your reasoning.