

Present neatly on separate paper. Justify for full credit. No Calculators.

Name \_\_\_\_\_ Score \_\_\_\_\_ A (30 minutes) **x5**  
For questions 1 through 5, determine whether the series converges or diverges.

1)

$$\sum_{n=1}^{\infty} \frac{n^2 + 1}{n^3 + 1}$$

---

2)

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

---

3)

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

---

4)

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

---

5)

$$\sum_{n=1}^{\infty} \frac{(-5)^{2n}}{n^2 9^n}$$

---

6)

State the following.

- (a) The Test for Divergence
- (b) The Integral Test
- (c) The Comparison Test

Present neatly on separate paper. Justify for full credit. No Calculators.

Name \_\_\_\_\_ Score \_\_\_\_\_ F (30 minutes) **x5**  
For questions 1 through 5, determine whether the series converges or diverges.

1)

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

---

2)

$$\sum_{n=1}^{\infty} \frac{n^3}{5^n}$$

---

3)

$$\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}}$$

---

4)

$$\sum_{n=1}^{\infty} \frac{\cos 3n}{1 + (1.2)^n}$$

---

5)

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

---

6)

- What is an absolutely convergent series? What can you say about such a series?
- What is a  $p$ -series? Under what circumstances is it convergent?
- What is a geometric series? Under what circumstances is it convergent? What is its sum?