Name: ______________________ Mark: ______________________

Mini-math AP Calculus BC: Friday, October 8, 2021 (8 minutes)

1. (1 point) Which of the following conclusions can be drawn about the series $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{\sqrt{n}}$? The Alternating Series Test:

   A. is inconclusive because the terms are not alternating

   B. is inconclusive because the absolute value of the terms do not limit to 0

   C. is inconclusive because the absolute value of the terms is not decreasing

   D. applies and the series converges

Solution: D

2. (2 points) Does the following series converge or diverge?

$$\sum_{n=1}^{\infty} \frac{9^n(n+1)}{4^{2n-1}}$$

Solution: We compute

$$L = \lim_{n\to\infty} \left| \frac{9^{n+1}(n+2)}{4^{2(n+1)-1}} \cdot \frac{4^{2n-1}}{9^n(n+1)} \right| = \lim_{n\to\infty} \left| \frac{n+2}{n+1} \cdot \frac{9}{16} \right| = \frac{9}{16} < 1$$

Then the Ratio Test tells us that the series converges (absolutely).

3. (2 points) Does the following series converge or diverge?

$$\sum_{n=1}^{\infty} \frac{(-2)^{3n}}{7^n \ln n}$$

Solution: We compute

$$L = \lim_{n\to\infty} \left| \frac{(-2)^{3(n+1)}}{7^{n+1}\ln(n+1)} \cdot \frac{7^n \ln n}{(-2)^{3n}} \right| = \lim_{n\to\infty} \left| \frac{-8}{7} \cdot \frac{\ln n}{\ln(n+1)} \right| = \frac{8}{7} > 1$$

Then the Ratio Test tells us that the series diverges.