

AP Calculus BC

Lesson 12.4 The Comparison Test

1. Determine under what conditions the series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges.

2. (a) Does the series $\sum_{n=1}^{\infty} \frac{1}{2^n}$ converge or diverge? Explain your reasoning.

(b) Explain why $\sum_{n=1}^{\infty} \frac{1}{2^n + 1} \geq 0$.

(c) Determine whether $\sum_{n=1}^{\infty} \frac{1}{2^n + 1}$ converges or diverges. Explain your reasoning.

3. Consider the series $\sum_{n=0}^{\infty} \frac{1}{n!}$. Determine whether this series converges or diverges. Explain your reasoning.

4. Determine whether each series converges or diverges.

1. $\sum_{n=1}^{\infty} \frac{1}{n2^n}$

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

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

4. $\sum_{n=1}^{\infty} \frac{\ln(n)}{n}$

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

6. $\sum_{n=1}^{\infty} \frac{\tan^{-1}(n)}{n}$

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

8. $\sum_{n=1}^{\infty} \frac{n^2}{4n^3+1}$

9. $\sum_{n=1}^{\infty} \frac{n^n}{n}$

10. $\sum_{n=1}^{\infty} \frac{\cos^2(n)}{3^n}$

11. $\sum_{n=1}^{\infty} \frac{n}{\ln(n)}$

12. $\sum_{n=1}^{\infty} \frac{n}{5n^2+3}$

13. $\sum_{n=1}^{\infty} \left(1 + \frac{.05}{n}\right)^n$

14. $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2+1}$

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

16. $\sum_{n=1}^{\infty} \frac{2n+3}{(n^2+3n)^2}$