

# 10.5 Harmonic and $p$ -series

Calculus

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

**CA #1**

1. Determine the convergence or divergence of the  $p$ -series  $\sum_{n=1}^{\infty} n^{-2}$ .
  
2. For what values of  $p$  will the infinite series  $\sum_{n=1}^{\infty} \frac{1}{n^{1-p}}$  converge?
  
3. For what values of  $p$  will both infinite series  $\sum_{n=1}^{\infty} \left(\frac{3}{p}\right)^n$  and  $\sum_{n=1}^{\infty} \frac{1}{n^{5-p}}$  converge?
  
4. What are all values of  $p$  for which  $\int_1^{\infty} x^{-(3p-2)} dx$  converges?
  
5. Which of the following is a divergent  $p$ -series?

A.  $\sum_{n=1}^{\infty} n^{-\pi}$

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

C.  $\sum_{n=1}^{\infty} \left(\frac{e}{\pi}\right)^n$

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

1. $d = 2 > 1$ , convergent $p$ -series	2. $d > 0$	3. $d < -3$ or $3 < d < 4$	4. $d > 1$	5. B
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