

# 10.5 Harmonic and $p$ -series

Calculus

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

**CA #2**

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

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

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

C.  $\sum_{n=1}^{\infty} \sqrt{n^{-3}}$

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

1. $d = \frac{2}{3} < 1$ , convergent $p$ -series	2. $d > 1$	3. $-1 < d < 5$	4. $d < -1$	5. C
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