Name: Solutions                          Section:   11   12   13

Determine if the following series converge or diverge; you may use techniques of geometric series, telescoping series, $p$-series, divergence test, and integral test. If the series is geometric or telescoping find its sum.

1. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt[5]{n^2}}$ $= \displaystyle\sum_{n=1}^{\infty} \frac{1}{n^{2/5}}$  $p$-series

$p = 2/5 < 1$

series diverges

2. $\displaystyle\sum_{n=2}^{\infty} \frac{2^{n-1}}{5^n}$ $= \displaystyle\sum_{n=2}^{\infty} \frac{1}{2} \cdot \left(\frac{2}{5}\right)^n$  geometric

$r = \frac{2}{5}, \quad |r| < 1$

converges

$= \dfrac{\text{first term}}{1 - \text{ratio}}$

$= \dfrac{\frac{1}{2} \cdot \left(\frac{2}{5}\right)^2}{1 - \frac{2}{5}} \cdot \frac{25}{25} = \frac{2 \cdot 5}{25 - 2} = \frac{10}{23}$