Series — Interval of convergence

Name: _____ Date: _____

Find the interval of convergence. Check both endpoints.

1 $\sum_{n=1}^{\infty} \frac{x^n}{n \cdot 2^n}$

$\frac{|a_{n+1}|}{|a_n|} = \frac{|x|}{2} \cdot \frac{n}{n+1}$

$L = \frac{|x|}{2} < 1$: $R = 2$, $-2 < x < 2$

$x = 2$: $\sum \frac{1}{n}$ diverges ($p = 1$)

$x = -2$: $\sum (-1)^n \frac{1}{n}$ converges (alternating)

Interval: $[-2, 2)$

2 $\sum_{n=1}^{\infty} \frac{(-1)^n (x+1)^n}{n \cdot 3^n}$

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

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

Series · Interval of convergence — Answer key

1. $\sum_{n=1}^{\infty} \frac{x^n}{n \cdot 2^n}$ → $[-2, 2)$

2. $\sum_{n=1}^{\infty} \frac{(-1)^n (x+1)^n}{n \cdot 3^n}$ → $(-4, 2]$

3. $\sum_{n=1}^{\infty} \frac{x^n}{n^2}$ → $[-1, 1]$

4. $\sum_{n=1}^{\infty} \frac{(x-2)^n}{2^n}$ → $(0, 4)$