9. [8 points] A power series centered at $x = 3$ given by

$$\sum_{n=0}^{\infty} \frac{n^2 + 1}{2^n(n + 2)}(x - 3)^n.$$

The radius of convergence of this power series is 2 (do NOT show this). Find the **interval** of convergence of this power series. Show all your work, including full justification for series behavior.

Interval of convergence: _____