3. [10 points] Consider the power series
\[ \sum_{n=0}^{\infty} \frac{(n!)^2}{5^n(2n)!} (x - 9)^n. \]

a. [1 point] What is the center of the interval of convergence of this power series?

Answer: \( x = 9 \)

b. [5 points] What is the radius of convergence of this power series? Show your work.

\[
\lim_{n \to \infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n \to \infty} \left( \frac{(n + 1)!^2}{5^{n+1}(2n + 2)!} \right) \frac{5^n(2n)!}{(n!)^2} = \lim_{n \to \infty} \frac{(n + 1)^2}{5(2n + 2)(2n + 1)} = \frac{1}{20}.
\]

Therefore \( R = 1/(\frac{1}{20}) = 20. \)

Answer: \( \text{Radius of convergence} = 20 \)

c. [4 points] A certain power series \( \sum_{n=1}^{\infty} C_n (x - 4)^n \) converges when \( x = 1 \) and diverges when \( x = 13 \). Which of the following could be the radius of converge of this series? Circle all possibilities from the list below.

0 1 3 7 9 13 \( \infty \) NONE OF THESE