7. [10 points]

a. [5 points] Determine the radius of convergence of the power series \( \sum_{n=0}^{\infty} \frac{n^2(2n)!}{2^n(n!)^2} x^{2n} \).

Answer: 

b. [5 points] You do not need to justify your answers below.

Suppose \( C_n \) is a sequence such that the following are true:

- \( C_n \) is a monotone decreasing sequence
- \( C_n \) converges to 0
- \( \sum_{n=0}^{\infty} C_n \) diverges
- \( \sum_{n=0}^{\infty} \frac{C_n(x+3)^n}{4^n} \) has radius of convergence 4.

What is the center of convergence of \( \sum_{n=0}^{\infty} \frac{C_n(x+3)^n}{4^n} \)?

Answer: 

What are the endpoints of the interval of convergence of \( \sum_{n=0}^{\infty} \frac{C_n(x+3)^n}{4^n} \)?

Answer: Left endpoint at \( a = \) 

Right endpoint at \( b = \) 

Let \( a \) and \( b \) be the left and right endpoints of the interval of convergence you found above. Which of the following could be the interval of convergence of \( \sum_{n=0}^{\infty} \frac{C_n(x+3)^n}{4^n} \)?

\([a, b] \quad (a, b] \quad (a, b) \quad [a, b]\)