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16. For what values of x does the series below converge? What is its sum? What series do you get if you differentiate the given series term by term? For what values of x does the new series converge? What is its sum?

$$1 - \frac{1}{3}(x-8) + \frac{1}{9}(x-8)^2 + \cdots + \left(-\frac{1}{3}\right)^n (x-8)^n + \cdots$$

For what values of x does the series converge? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

✅ **A.** The series converges for $\boxed{5 < x < 11}$.
    (Type a compound inequality. Simplify your answer. Use integers or fractions for any numbers in the expression.)

⭕ **B.** The series converges only at x = $\boxed{}$. (Type an integer or a simplified fraction.)

⭕ **C.** The series converges for all values of x.

The sum of the series within its interval of convergence is $\boxed{\dfrac{3}{x-5}}$.

What series do you get if you differentiate the given series term by term?

⭕ **A.** $f'(x) = \displaystyle\sum_{n=1}^{\infty} (n-1)\left(-\frac{1}{3}\right)^{n-1}(x-8)^{n-1}$

⭕ **B.** $f'(x) = \displaystyle\sum_{n=1}^{\infty} \left(-\frac{1}{3}\right)^{n}(x-8)^{n-1}$

✅ **C.** $f'(x) = \displaystyle\sum_{n=1}^{\infty} n\left(-\frac{1}{3}\right)^{n}(x-8)^{n-1}$

⭕ **D.** $f'(x) = \displaystyle\sum_{n=0}^{\infty} n\left(-\frac{1}{3}\right)^{n}(x-8)^{n}$

For what values of x does the new series converge? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

✅ **A.** The series converges for $\boxed{5 < x < 11}$.
    (Type a compound inequality. Simplify your answer. Use integers or fractions for any numbers in the expression.)

⭕ **B.** The series converges only at x = $\boxed{}$. (Type an integer or a simplified fraction.)

⭕ **C.** The series converges for all values of x.

The sum of the new series within its interval of convergence is $\boxed{-\dfrac{3}{(x-5)^2}}$.