

## Problem 19

In each of Problems 19 and 20, verify the given equation.

$$\sum_{n=0}^{\infty} a_n(x-1)^{n+1} = \sum_{n=1}^{\infty} a_{n-1}(x-1)^n$$

---

### Solution

Begin with the left side.

$$\sum_{n=0}^{\infty} a_n(x-1)^{n+1}$$

Let  $k = n + 1$ .

$$\sum_{k-1=0}^{\infty} a_{k-1}(x-1)^k$$

Solve for  $k$ .

$$\sum_{k=1}^{\infty} a_{k-1}(x-1)^k$$

As  $k$  is only a dummy index, it can be replaced with  $n$ .

$$\sum_{n=1}^{\infty} a_{n-1}(x-1)^n$$