

Problem #2 Test 2 sample and Test

Note: $\sum_{n=0}^{\infty} x^n = (1-x)^{-1}$

Differentiating both sides:

$$\sum_{n=0}^{\infty} nx^{n-1} = (-1)(1-x)^{-2}(-1) \\ = (1-x)^{-2}$$

Differentiating both
sides again:

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

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

Note when $n=0$ and $n=1$
the terms in the sum = 0

$$\therefore \sum_{n=2}^{\infty} n(n-1)x^{n-2} = \frac{2}{(1-x)^2}$$