PRINT Your Name:_____

Remove everything from your desk except a pencil or pen.

Write in complete sentences.

The quiz is worth 5 points.

Find the sum of $\displaystyle\sum_{n=1}^{\infty} nx^n$ for $|x| < 1$.

Answer. We know that $\displaystyle\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$ for $|x| < 1$. Take the derivative to get

$\displaystyle\sum_{n=0}^{\infty} nx^{n-1} = \frac{1}{(1-x)^2}$ for $|x| < 1$. Multiply by x to get: $\displaystyle\sum_{n=0}^{\infty} nx^n = \frac{x}{(1-x)^2}$ for $|x| < 1$.

Of course, when $n = 0$, nx^n is zero; so $\displaystyle\sum_{n=1}^{\infty} nx^n = \frac{x}{(1-x)^2}$ for $|x| < 1$.