

PRINT Your Name: \_\_\_\_\_

**Quiz 13 — April 18, 2014 – Section 7 – 12:00 – 12:50**

**Remove everything from your desk except this page and a pencil or pen.**

The solution will be posted soon after the quiz is given.

**Circle** your answer. **Show your work.** Your work must be correct and coherent.

The quiz is worth 5 points.

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

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

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

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