PRINT Your Name:_____

Quiz 11 — November 11, 2013 – Section 2 – 4:40 – 5:30

Remove everything from your desk except a pencil or pen.

Write in complete sentences. Explain your work!
The quiz is worth 5 points.

Does the series $\sum_{k=1}^{\infty} k(\frac{2}{3})^k$ converge? **Explain what you are doing VERY THOROUGHLY. Write in complete sentences.**

Answer: We apply the ratio test. Let

$$\rho = \lim_{k\to\infty} |\tfrac{a_k}{a_{k-1}}| = \lim_{k\to\infty} |\tfrac{k(\frac{2}{3})^k}{(k-1)(\frac{2}{3})^{k-1}}| = \lim_{k\to\infty} \tfrac{k}{(k-1)}(\tfrac{2}{3}) = \lim_{k\to\infty} \tfrac{1}{(1-\frac{1}{k})}(\tfrac{2}{3}) = \tfrac{2}{3} < 1.$$

The parameter ρ is less than 1; so, the ratio test ensures that

$\boxed{\text{the series } \sum_{k=1}^{\infty} k(\frac{2}{3})^k \text{ converges.}}$