Date: June 18, 2013, Tuesday NAME:.....

STUDENT NO:.....

DEPARTMENT:.....

Math 102 Summer 2013 – QUIZ # 2 – Section 001

Find the radius of convergence and interval of convergence of the series $\sum_{n=1}^{\infty} \frac{10^n x^n}{n^3}$.

Solution:

We use the root test:

$$\lim_{n\to\infty} \left(\frac{10^n |x|^n}{n^3} \right)^{1/n} = \lim_{n\to\infty} \frac{10|x|}{n^{3/n}} = 10|x|.$$

Then the series converges absolutely when $10|x| < 1$, or when $|x| < 1/10$.

When $x = 1/10$, we have $a_n = \frac{1}{n^3}$, and when $x = -1/10$, we have $a_n = (-1)^n/n^3$. In both cases the series converges.

Therefore the radius of convergence is $1/10$, and the interval of convergence is $|x| \leq 1/10$.