PRINT Your Name:__________________

Quiz 9 — March 21, 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.

$\boxed{\text{Circle}}$ your answer. **Show your work. Your work must be correct and coherent.**
The quiz is worth 5 points.

Find the values of x for which the series $\sum_{n=0}^{\infty} 4^n x^n$ converges. Find the sum of the series for those values of x. Explain what you are doing. Your work must be correct and meaningful.

Answer: The given series is the geometric series with initial term $a = 1$ and ratio $r = 4x$. This geometric series converges if $-1 < 4x < 1$; that is, if $\frac{-1}{4} < x < \frac{1}{4}$. When $-1 < r < 1$, then the geometric series $a \sum_{n=0}^{\infty} r^n$ converges to $\frac{a}{1-r}$, which, for us, is $\frac{1}{1-4x}$. We conclude that

$$\boxed{\begin{array}{l}\text{The series } \sum_{n=0}^{\infty} 4^n x^n \text{ converges for } \frac{-1}{4} < x < \frac{1}{4} \\ \text{and when } \frac{-1}{4} < x < \frac{1}{4}, \text{ then } \sum_{n=0}^{\infty} 4^n x^n \text{ converges to } \frac{1}{1-4x}.\end{array}}$$