

## Quiz 8

NAME: \_\_\_\_\_

RECITATION: Mon8 Mon9 Wed8 Wed9

1. Find the radius and interval of convergence for the following series:

$$\sum_{n=1}^{\infty} n^n x^n$$

ROOT TEST:  $\sqrt[n]{|a_n|} = \sqrt[n]{n^n |x|^n} = n|x|$

$$\lim_{n \rightarrow \infty} \sqrt[n]{|a_n|} = \lim_{n \rightarrow \infty} n|x| = \begin{cases} 0 & \text{if } x=0 \\ \text{DIV} & \text{if } x \neq 0 \end{cases}$$

$R = \text{RADIUS of CONV} = 0$

CONV ONLY if  $x=0$

2. Find the interval of convergence for the following series, and find the sum of the series as a function of  $x$ :

$$\sum_{n=0}^{\infty} \frac{(x-1)^{2n}}{4^n}$$

GEOMETRIC SERIES  $r = \frac{(x-1)^2}{4}$  so:

CONV IF  $|r| < 1$ ,  $\frac{|x-1|^2}{4} < 1$ ,  $|x-1|^2 < 4$ ,  $|x-1| < 2$   
CONV

DIV IF  $|r| \geq 1$

(DIV IF  $|x-1| \geq 2$ )

$$\sum_{n=0}^{\infty} \left( \frac{(x-1)^2}{4} \right)^n = \frac{1}{1 - \frac{(x-1)^2}{4}} \quad \text{as } |x-1| < 2$$
$$-2 < x-1 < 2$$
$$-1 < x < 3$$