MATH 1930 Sec 092
HONORS CALCULUS II
QUIZ 4
March 15, 2013

Name (Last, First) Key

1. Find the series' radius of convergence.

$$\sum_{n=1}^{\infty} \frac{4^n x^{2n}}{n}$$

$$\left|\frac{a_{n+1}}{a_n}\right| = \frac{4^{n+1} x^{2n+2} \cdot n}{(n+1) 4^n x^{2n}}$$

$$= \left|4x^2 \cdot \frac{n}{n+1}\right|$$

$$\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| = 4|x|^2 < 1$$

$$\Rightarrow |x|^2 < \frac{1}{4} \Rightarrow |x| < \frac{1}{2}$$

$$\therefore \boxed{R = \frac{1}{2}}$$

2. Find the series' interval of convergence.

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(x+2)^n}{n2^n}$$

$$\left|\frac{a_{n+1}}{a_n}\right| = \left|\frac{(-1)^{n+2}(x+2)^{n+1}\, n2^n}{(n+1)2^{n+1}(-1)^{n+1}(x+2)^n}\right|$$

$$= \frac{|x+2|}{2} \cdot \frac{n}{n+1}$$

$$\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| = \frac{|x+2|}{2} < 1 \Rightarrow |x+2| < 2$$

$$-2 < x+2 < 2$$

$$-4 < x < 0$$

At $x=0$ the series is $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n}$ which converges.

At $x=-4$, the series diverges.

$$\therefore \boxed{I = (-4, 0]}$$