Math 120 Spring 2014 Quiz **EIGHT**

SHOW YOUR WORK

Find the interval of convergence and radius of convergence for each of the following infinite series

(a) (*5 points*) $\sum_{k=1}^{\infty} -\frac{x^{2k}}{k}$ $= -x^2 - \frac{x^4}{2} - \frac{x^6}{3} + \frac{x^4}{4} - \cdots$

$$\frac{1}{R} = \lim_{k\to\infty} \left| \frac{\frac{-1}{k+1}}{\frac{-1}{k}} \right| = \lim_{k\to\infty} \frac{k}{k+1} = 1$$

Check $x = 1$

$$\sum -\frac{1}{k} 1^{2k} = \sum_{k=1}^{\infty} -\frac{1}{k} \quad \text{DIVERGES}$$

Check $x = -1$

$$\sum \frac{-1}{k} (-1)^{2k} = \sum_{k=1}^{\infty} -\frac{1}{k} \quad \text{DIVERGES}$$

Interval of convergence $(-1, 1)$

$R = 1$

(b) (*5 points*) $\sum_{k=0}^{\infty} \frac{x^k}{k!}$

$$\frac{1}{R} = \lim_{k\to\infty} \left| \frac{\frac{1}{(k+1)!}}{\frac{1}{k!}} \right| = \lim_{k\to\infty} \left| \frac{k!}{(k+1)!} \right| = \lim_{k\to\infty} \frac{1}{k+1} = 0 \qquad R = \infty$$

Converges for every x value, i.e $(-\infty, \infty)$