Worksheet week 12 - MAC2312 Fall 2012 **NAME:** _____

1. Decide if each of the following series is convergent or divergent. Specify which test you are using and show how the test applies.

(a) $\displaystyle\sum_{k=0}^{\infty} \frac{1}{(2k+1)^2}$ (b) $\displaystyle\sum_{k=1}^{\infty} \frac{k}{\sqrt{k^3+1}}$ (c) $\displaystyle\sum_{k=1}^{\infty} \frac{(k!)^2}{(2k)!}$

2. Find the values of p for which the series is convergent $\displaystyle\sum_{k=2}^{\infty} \frac{1}{k(\ln k)^p}$

3. True or False. Answer and briefly justify in each case.

(a) If $S_n = \displaystyle\sum_{k=1}^{n} a_k$ and $\displaystyle\lim_{n\to\infty} S_n$ does not exist or is not finite, then $\displaystyle\sum_{k=1}^{\infty} a_k$ is a divergent series .

(b) If $\{a_k\}_k$ is a convergent sequence then the series $\displaystyle\sum_{k=1}^{\infty} a_k$ is also convergent.

(c) If $\{a_k\}_k$ is a divergent sequence then the series $\displaystyle\sum_{k=1}^{\infty} a_k$ is also divergent

(d) If $\displaystyle\sum_{k=1}^{\infty} a_k$ converges to A and $\displaystyle\sum_{k=1}^{\infty} b_k$ converges to B, then $\displaystyle\sum_{k=1}^{\infty} (a_k - b_k)$ converges to $A - B$.

(e) If $a_k > 0$ for all k and $\displaystyle\sum_{k=1}^{\infty} a_k$ converges, then $\displaystyle\sum_{k=1}^{\infty} (a_k)^2$ also converges.