Math 1172 - Autumn 2015 Name: ______________________

Quiz 6 - Take Home Recitation Instructor: ______________________

SHOW ALL WORK!!! Unsupported answers might not receive full credit. CLEARLY label your responses to parts a) and b) and use the back of this paper if necessary.

Problem 1 Determine whether the following series converge or diverge. JUSTIFY your answers!

a) [1 pt] $\sum_{k=0}^{\infty} \frac{3-4k^2}{k^2+2k-7}$

$$\lim_{k\to\infty} \frac{3-4k^2}{k^2+2k-7} = \lim_{k\to\infty} \frac{\frac{1}{k^2}(3-4k^2)}{\frac{1}{k^2}(k^2+2k-7)} = \lim_{k\to\infty} \frac{\frac{3}{k^2}-4}{1+\frac{2}{k}-\frac{7}{k^2}} = \frac{-4}{1} \neq 0.$$

By the Divergence Test, the series in a) diverges.

b) [1 pt] $\sum_{k=0}^{\infty} \frac{3^k+2^{2k}}{5^k}$

$\sum_{k=0}^{\infty} \frac{3^k}{5^k} = \sum_{k=0}^{\infty} \left(\frac{3}{5}\right)^k$ converges because $\left|\frac{3}{5}\right| < 1$.

$\sum_{k=0}^{\infty} \frac{2^{2k}}{5^k} = \sum_{k=0}^{\infty} \left(\frac{4}{5}\right)^k$ converges because $\left|\frac{4}{5}\right| < 1$.

Hence, $\sum_{k=0}^{\infty} \frac{3^k+2^{2k}}{5^k}$ converges.

Problem 2 [2 pts] For a sequence $\{a_n\}_{n\geq 1}$ let $s_n = \sum_{k=1}^{n} a_k$ denote its sequence of partial sums and let $\{a_n\}_{n\geq 1}$ be a sequence such that $\sum_{k=1}^{\infty} s_k$ converges.

Determine whether there is sufficient information to determine whether $\sum_{k=1}^{\infty} a_k$ converges. If it converges, clearly explain to what value(s) it could converge.

Since $\sum_{k=1}^{\infty} S_k$ converges, $\lim_{k\to\infty} S_k = 0$,

So that $\sum_{k=1}^{\infty} a_k$ converges to 0, by definition.