Math 1172 - Autumn 2015 Name: ____________________

Quiz 6 - In Class Recitation Instructor: ____________________

SHOW ALL WORK!!! Unsupported answers might not receive full credit.

Problem 1 [3 pts] True or False

Directions: CIRCLE ALL of the statements that are TRUE. No explanation is necessary. Note that there may be several statements that are true for each question! This question is worth 3 pts, with 1 deducted for each incorrect answer. You cannot score below 0 for this problem.

Suppose that $\{a_n\}_{n\geq 1}$ is a sequence and $\sum_{n=1}^{\infty} a_n$ converges to $L > 0$. Let $s_n = \sum_{k=1}^{n} a_k$.

A. $\lim_{n\to\infty} a_n = L$

B. $\lim_{n\to\infty} a_n = 0$

C. $\lim_{n\to\infty} s_n = 0$

D. $\lim_{n\to\infty} s_n = L$

E. $\sum_{n=1}^{\infty} s_n$ MUST diverge

F. $\sum_{n=1}^{\infty} (a_n + 1) = L + 1$

G. The divergence test tells us $\sum_{n=1}^{\infty} a_n$ converges to L.

Problem 2 [3 pts]

Determine whether the series:

$$\sum_{k=1}^{\infty} 2^{2-2k}$$

converges or diverges and if it converges, give its value. JUSTIFY your answer!

$$\sum_{k=1}^{\infty} 2^{2-2k} = \sum_{k=1}^{\infty} 2^2 \cdot \frac{1}{2^{2k}} = \sum_{k=1}^{\infty} 2^2 \left(\frac{1}{2^2}\right)^k = \sum_{k=1}^{\infty} 2^2 \cdot \left(\frac{1}{4}\right)^k$$

The ratio is $r = \frac{1}{4}$; $|r| < 1$. So the series converges to

$$\frac{\text{1st term}}{1-r} = \frac{2^{2-2\cdot 1}}{1-\frac{1}{4}} = \frac{1}{\frac{3}{4}} = \frac{4}{3}.$$

(You can also use $\frac{a_{k+1}}{a_k}$ to find r :

$$r = \frac{a_{k+1}}{a_k} = \frac{2^{2-2(k+1)}}{2^{2-2k}} = 2^{2-2k-2-2+2k} = 2^{-2} = \frac{1}{4}.)$$