

Name: SOLUTIONS

Quiz #3 - September 8, 2006

1. Complete the following definition precisely:

$$\lim_{x \rightarrow a} f(x) = L$$

if

For any $\epsilon > 0$ there exists a $\delta > 0$ such that
 $0 < |x - a| < \delta$ implies $|f(x) - L| < \epsilon$.

2. Decide if each series converges and if so what is the sum:

a.

$$\frac{5}{2} - \frac{10}{6} + \frac{20}{18} - \frac{40}{54} + \frac{80}{162} - \dots$$

$$a_1 = 5/2 \quad r = -2/3$$

$$\Sigma = \frac{5/2}{1 - (-2/3)} = \frac{5/2}{5/3} = \left(3/2\right)$$

b.

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \dots$$

Diverges

3. Suppose

$$\sum_{n=1}^{\infty} a_n$$

is a convergent series. What, if anything, can you say about $\lim_{n \rightarrow \infty} a_n$. Explain your answer.

It must be zero. Since the series converges the partial sums converge. Thus the differences between S_{n+1} and S_n go to zero. But $S_{n+1} - S_n = a_{n+1}$ so the a_n 's $\rightarrow 0$.