

Your name: \_\_\_\_\_

Quiz no. 5 (1220-5 Calculus II, Fall 2006)  
November 7, 2006

**25 min. No symbolic calculators allowed (TI-89 and similar)!**  
(TI-86 or lower are allowed.)

1. (4 points) Determine the value of the following series:

$$\frac{1}{2} + \frac{1}{3} + \frac{2}{9} + \frac{4}{27} + \cdots =$$

2. (12 points) Find out which of the following series converges. Indicate which test you use.

(a)

$$\sum_{n=2}^{\infty} \frac{n}{e^n}$$

(b)

$$\sum_{n=2}^{\infty} \frac{\sqrt{n+1}}{\sqrt{n^3+1}}$$

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(c)

$$\sum_{k=1}^{\infty} \frac{n^2}{n!}$$

3. (5 points) Compute this series: *Hint: Use a partial fraction decomposition.*

$$\sum_{k=1}^{\infty} \frac{1}{(2k-1)(2k+1)} = \frac{1}{1 \cdot 3} + \frac{1}{3 \cdot 5} + \frac{1}{5 \cdot 7} + \dots$$

4. (4 points) Assume you know that the sequence given by

$$a_1 = 2, \quad a_{n+1} = a_n + \frac{1}{a_n} - 1$$

has a limit  $L = \lim_{n \rightarrow \infty} a_n$ . Determine the limit by finding an equation for  $L$ .