



Norwegian University of Science
and Technology
Department of Mathematical
Sciences

TMA4100 Calculus 1
Fall 2013

Exercise set 13
Week 47 (November 18 - 22)

1: Maple TA-problem Consider the sum

$$\sum_{n=1}^{\infty} \frac{1}{2n-1} \left(\frac{ax+3}{-4} \right)^n,$$

where a is a positive, real number.

Determine the values of x for which the series

- i) converges absolutely,
- ii) converges conditionally,
- iii) diverges.

2: Exam 1998 in SIF 5003, problem 6 a) Show that the series

$$\sum_{n=2}^{\infty} (-1)^{n+1} \left(\frac{n-1}{n^2} \right)$$

converges. Is the convergence absolute or conditional?

b) The partial sum

$$S_9 = \sum_{n=2}^9 (-1)^{n+1} \left(\frac{n-1}{n^2} \right)$$

is an approximation to the sum S of the series in a). What can you say about $|S_9 - S|$?

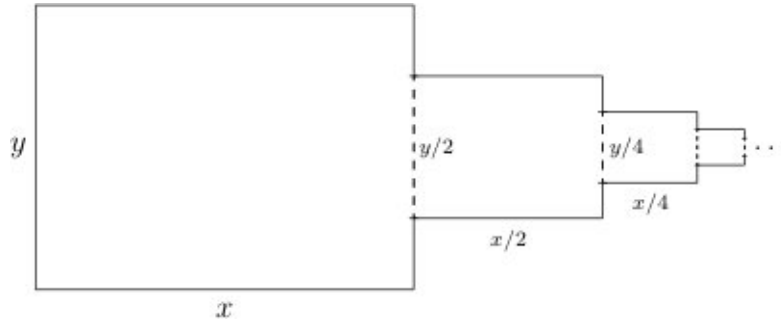
3: Induction Use induction to show that

$$\sum_{i=0}^n x^i = \frac{1-x^{n+1}}{1-x}$$

for $n \geq 1$ and $x \neq 1$.

4:Exam 2003 in TMA4100, problem 10

A figure is made in the following way: We start with a rectangle with sides x and y , and then add a smaller rectangle with sides $\frac{1}{2}x$ and $\frac{1}{2}y$, and then add another with sides $\frac{1}{4}x$ and $\frac{1}{4}y$ and so forth, *ad infinitum*, as indicated in the figure below.



The circumference of the figure is 6. What values of x and y makes the area maximal?