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## Multimedia Systems

# Exercise No. 1

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**Notes:**

- The exercise sheet will be discussed within the exercise course in the following week (Tuesday, 2.00 pm, 32-349).
  - We strongly recommend to deal with the exercise sheets and to attend the exercise course.
  - You can optionally hand in your solutions until Thursday, 12.00 am, room 34-310. They will be corrected till the following lecture.
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1. An ISDN telephone has an integrated low-pass, which filters the incoming voice signal from the mouthpiece.

- a) What is the function of the integrated low-pass?
- b) What is the sampling rate of the ISDN telephone system? Why?
- c) Suppose the low-pass is removed. How would a dialog partner perceive a high sound with a frequency of  $f = 7000$  Hz?

2. Calculating with decibel.

- a) Show the following:
    - doubling the power results in a approx. +3 dB
    - a tenfold increase of power results in +10 dB
  - b) How many decibel represents a thousandfold increase of power?
  - c) Speech has a typical power of  $10\mu\text{W}$ , a violin of  $1\text{mW}$  and a speaker of  $100\text{W}$ . Calculate the ratio in dB.
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