

# Foundations of Audio Signal Processing

## Exercise sheet 1

To be uploaded in eCampus till: 26-10-2018 22:00 (strict deadline)

The solutions of the exercises have to be handed in via eCampus (you have to upload them) till the date and time reported on top of each exercise sheet. Please note that the deadline is strict: solutions handed in later will be rejected by the system and cannot be considered. The exercises have to be solved in groups: solutions handed in without specifying a group of 2-4 students will not be considered. Please remember to write the names of *all* the members of the groups on the solutions.

### Exercise 1.1

[2 + 2 + 2 + 2 = 8 points]

The following statements have a complex number  $a + ib$  as a result. Please calculate explicitly the values of  $a$  and  $b$ . Do not use a calculator.

(a)  $(4 - i) \cdot (2 + i)$

(b)  $(1 + 2i)^{-1}$

(c)  $2e^{2\pi i} + e^{i\pi 3/2}$

(d)  $4 \left( \frac{1 - i}{1 + i} \right)^2$

### Exercise 1.2

[0 + 4 = 4 points]

This exercise is to make you become familiar with the Matlab programming environment. When sending your solutions for a programming task, you do not have to copy the code on the solutions sheet, but you have to provide an `.m` file.

Please note that you have to adhere to the following rules:

- For each programming task you have to hand in an `.m` file which has the same name as the task (for example `Sheet1Exercise2.m`).
  - The `.m` files you send have to be executable. In the code you also have to give an example of how to call your functions to get the desired result and explain each input/output.
- (a) Read the introduction to Matlab which you find on eCampus under "Additional material" and look at the examples presented.
- (b) Write a Matlab function that, given as input two complex numbers, calculates and plots their product and their quotient. (Hint: use the command `subplot`). Illustrate your results with two complex numbers of your choice.