Additional explanations to Exercise 1 - CI-Simulation

How to get a sound file from cochlear implant (CI) stimulation intensities?

General remarks:

- Every electrode has a specific frequency assigned to it, e.g. f_i
- At every time point, the sound is the sum of the n sine waves with the n different frequencies of the n electrodes of your CI. (see here for a more detailed explanation: https://en.wikibooks.org/wiki/Sensory_Systems/Computer_Models/Auditory_System_Simulation)
    - The frequencies of these sine waves are provided to you in the output of the GammaToneMake()-function
    - To get the amplitudes you need to know the following relation between stimulation intensity and amplitude: $I = A^2$

Starting from the Stimulation Intensities of the CI (output of GammaToneApply()):

- Split your sound sample into short time windows and then shift the window
- Then you can create the sound for each of these windows by:
    - ...creating the n sine waves with:
        - frequencies f_i over time Δt
        - And you can get their amplitudes by considering the following relation:

$$A_i^2 = I_i = \sum_{\text{all time points } t_j \text{ in your time window}} x_{it_j}^2$$

x_{itj}: stimulation strength of electrode$_i$ at time point t_j

    - … and then: sum them up and repeat this process for all the following time windows