SHS homework 2: Tones, sampling, Praat scripting

With **Praat → New → Sound → Create Sound from formula...**, you can create a sine wave (pure tone) by using the formula

```
0.3 * sin (2 * pi * frequency * x)
```

where *frequency* is any number. A pure tone is the most elementary sound possible; all other sounds can be constricted as combinations of pure tones (as you will see in Module **Spectrum**).

2.1. Generating a sound. Create tones with different frequencies and listen to them (keep the sampling frequency at 44100 Hz). Go up from 200 Hz in steps not greater than a factor of 1.5. What is the highest frequency that you can hear (don't go above 22050 Hz)?

2.2. Amplitude. The number 0.3 is the amplitude. How does changing this number to e.g. 0.1 or 0.8 change what you see in the Sound window and what you hear?

2.3. A nasty effect. Read chapter 3 of the SSP book. What happens if you set the amplitude of your tone higher than 1? What is the resulting effect called?

2.4. Samples. Your tone had a sampling frequency of 44100 Hz. Select a tone and use **Draw...** to draw a small part of the sound as "poles" (instead of "curve") into the Picture window (use **Erase all** until the poles are very well visible). Paste the resulting picture into your report.

2.5. Aliasing. Create a tone with a frequency of 43500 Hz (while keeping the sampling frequency at 44100 Hz). Although this frequency is way above the highest one that you found in **2.1**, you may be able to hear it. What frequency do you hear? Then try a frequency of 45000 Hz; what frequency do you hear? Draw small parts of those new sounds into the Picture window as poles. Explain how what you can see relates to what you heard.

2.6. Your first program that generates sounds. Read sections 1 through 5 of the Praat scripting tutorial (under **Help**), and chapter 4 of the SSP book (there is some overlap between the two). Write a Praat script that creates and plays four tones. Try to make your script play the first four notes of *Vader Jacob* (or the whole song, if you happen to know what the notes are and how these relate to frequency). You can achieve this either by a repetition of statements, or by using a procedure, or by using a vector and a loop. Paste your script into your report.

2.7. Your second program that generates sounds. Are you able to write the same functionality with Python? The nicest solution(s) will be shown in class.