

LING 450/550: Homework 3

Due: Tuesday, October 14, 2025 at 8:30am

Please read all instructions carefully before starting the assignment. The instructions include important information for this homework. If you have any questions, please ask them in class or via email.

Instructions

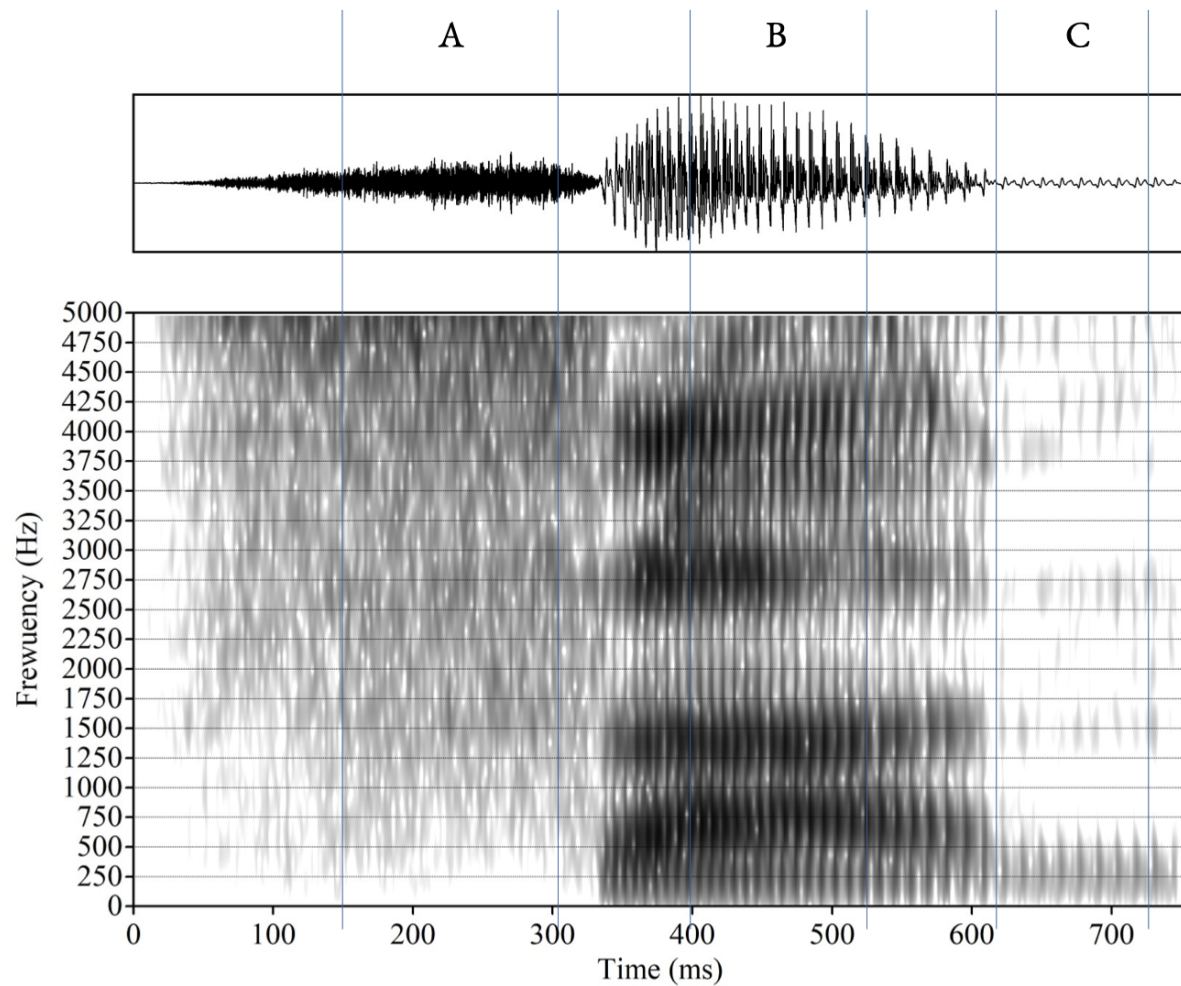
- **Assignments must be written in a separate document. You cannot write on this PDF.**
- Please submit your homework as a PDF file on Canvas by the deadline.
- You may work with other students in the class, but you must write up your solutions independently and in your own words. Please list any collaborators at the end of your assignment.
- You may use any resources you like, but please cite them appropriately using the [APA citation style](#) or the [Unified Style Sheet for Linguistics](#). If you use online resources, please make sure they are reputable and reliable.
- Please make sure your solutions are clear and well-organized. Use headings, bullet points, and diagrams where appropriate to help illustrate your points.
- If you have any questions or need clarification on any part of the assignment, please don't hesitate to reach out to me or the TA via email or during office hours.
- **AI tools (e.g., ChatGPT, Grammarly, Copilot, etc.) can only be used to help with grammar, spelling, and formatting on this assignment. Any other use will be considered a violation of course policy and will result in a 0.**

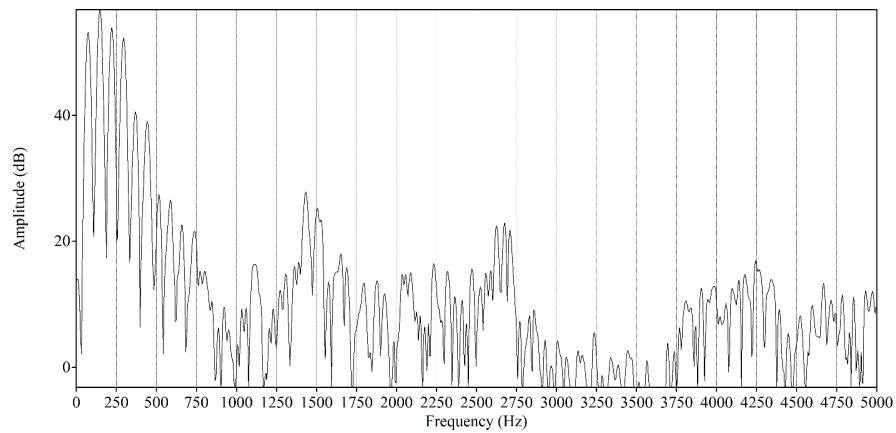
Part 1: Question about acoustics and articulation

1. If I were to artificially remove the harmonic corresponding to the fundamental frequency of a periodic signal, the fundamental frequency you hear will not perceptibly change to you. Write a few sentences explaining why.
2. Describe and compare what happens to the wavelength of a 200Hz sine wave if it is traveling through Sulphur Dioxide (213m/s), Helium (965m/s), and our vocal tracts (350m/s). This will require you to make use of the wavelength formula to answer this question.
3. What is the frequency of a $1.5\text{m } \lambda$ in Helium (Show your math)? How does this frequency compare to Sulphur Dioxide and to air in the vocal tract?

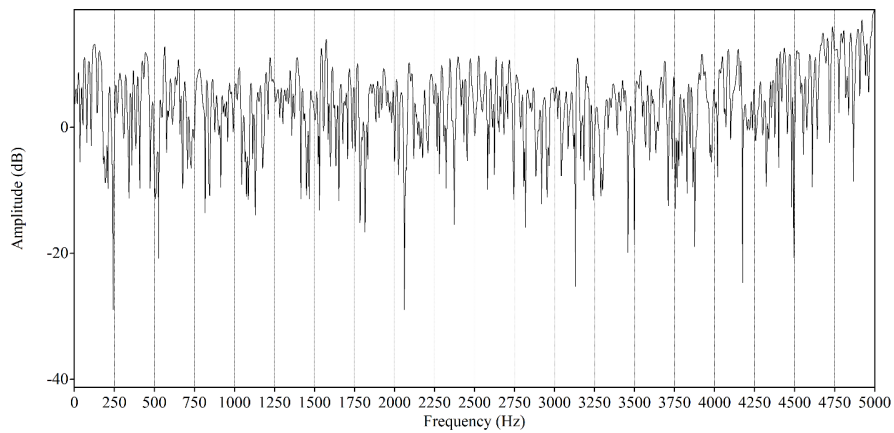
Part 2: Spectra and spectrograms

Study the spectrogram and waveform below, I took spectra from the slices (A-C) indicated. Which slice correspond to the spectra on the following page? Justify your answers by making specific reference to what you know about what spectra, waveforms, and spectrograms represent.

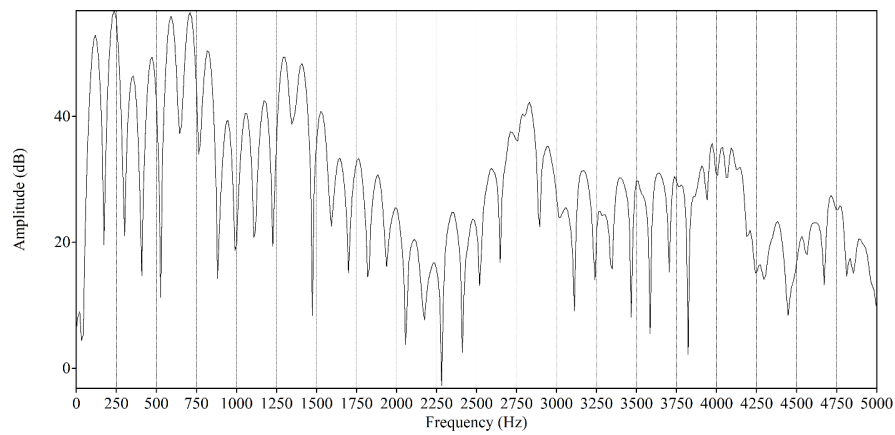




I



II



III