

DAT335 – Principles of Digital Audio
Cogswell Polytechnical College
Spring 2009

Assignment #1
Due 02/12/09

Part I

1. Which one of the following statements does not apply to the excitation pattern model of loudness perception?

- a. The excitation pattern model of loudness applies to both simple and complex sounds
- b. The excitation pattern model of loudness proposes that loudness is coded by activity in fibers tuned to the frequency of the sound stimulus
- c. The excitation pattern model proposes that the loudness of a sound is proportional to the summed neural activity it evokes in the auditory nerve
- d. The dynamic range of the whole population of nerve fibers is sufficient to account for the range of loudness perception
- e. Loudness meters incorporate a computation similar to that proposed by the excitation pattern model

2. Which one of the following correctly describes a band-pass noise with a centre frequency of 2000 Hz and a bandwidth of 400 Hz?

- a. It contains energy at all frequencies between 1800 and 2200 Hz, but no energy below 1800 Hz and above 2200 Hz
- b. It contains energy at all frequencies between 1600 Hz and 2000 Hz, but no energy below 1600 Hz and above 2000 Hz
- c. It contains energy at all frequencies between 2000 Hz and 2400 Hz, but no energy below 2000 Hz and above 2400 Hz
- d. It contains energy at all frequencies below 1600 and above 2000 Hz, but no energy between 1600 Hz and 2000 Hz
- e. It contains energy at all frequencies below 1800 and above 2200 Hz, but no energy between 1800 Hz and 2200 Hz

3. Which one of the following does not apply to critical-band masking in psychophysical tasks?

- a. The listener detects the signal when the response increment exceeds a minimum value
- b. The presence of the signal increases the level of activity in auditory filters tuned to its frequency
- c. The mask also produces excitation in auditory filters but this activity is unrelated to the presence or absence of a signal
- d. Masking is most effective when the mask centre frequency is very close to the signal frequency
- e. Masking is most effective when the mask centre frequency is very different from the signal frequency

4. Which one of the following is not associated with conductive hearing loss?

- a. Damage to the ossicles
- b. Damage to the tympanic membrane
- c. Cochlear damage
- d. A hearing aid can provide effective treatment
- e. Auditory thresholds are raised by up to 40-50 dB

5. Which one of the following does not cause cochlear damage?

- a. Exposure to intense sounds
- b. Ear wax
- c. Infection
- d. Presbycusis
- e. Allergy

6. Which one of the following is not associated with cochlear damage?

- a. Broader frequency tuning
- b. Elevated thresholds that cannot be improved by simply amplifying the incoming signal
- c. Loudness recruitment
- d. Impaired ability to segregate a speech signal from background noise
- e. Uniform elevation of threshold at all sound frequencies

Part II

Go to <http://www.phys.unsw.edu.au/jw/hearing.html> and plot your hearing response. Repeat the test one more time (at a different level) and compare both plots. Try to do the test for higher and lower levels for best comparison. Briefly answer the following questions:

1. What does your hearing curve mean?

2. How does your hearing response depend on loudness?