As always, the Honor Code is in effect…and you’ll need to write the code and sign it at the end of the exam. Read each question carefully and answer it completely. Although you have three hours to complete the exam, you shouldn’t need that long. I continue to think of a point as a minute. Thanks for all that you did to make this class a most enjoyable one for me. Good luck on the exam! Have a wonderful holiday!

Essay 1: Describe the timing and the place theories of pitch perception and include supporting and negative evidence for both theories. What problems does the Missing Fundamental create for these theories? [20 pts]

Essay 2: Context has been shown to play an important role in visual perception. You’ve also learned of several instances in which context plays an important role in auditory perception. Discuss several such examples. [20 pts]

1. The tonotopic organization found in the auditory system supports
   a. place theory.
   b. frequency theory.
   c. volley principle theory.
   d. none of the current theories.

2. Your uncle who has been taking large doses of aspirin for his arthritis complains of ringing in his ears. Of the choices below, what is his most probable diagnosis?
   a. tinnitus
   b. presbycusis
   c. eustachian disorder
   d. conduction deafness

3. Eyewitness identification is a difficult task, as indicated by
   a. d’ values of 2.0 or above.
   b. d’ values of .80 or below.
   c. values of 2.0 or above.
   d. values of .80 or below.

4. Suppose that you are told that you will be participating in a magnitude estimation study of loudness. It is likely that you will be asked to
   a. listen to a series of sounds decreasing in loudness and indicate when you no longer hear the sounds.
   b. say “I detect it” or “I do not detect it” for sounds that are either present or absent.
   c. adjust a sound until its estimated magnitude is substantially larger than that of a standard loudness.
   d. assign a number to indicate how loud a stimulus appears to be.
5. Vision and audition are two distinctly different forms of information processing. First of all, describe why both senses are useful to us (i.e., how do their functions differ). Next, describe how the two senses are similar to one another in their processing of information (without drawing on the context information that you use in your essay). Finally, briefly describe a situation in which the visual and auditory systems interact. [10 pts]

6. Weber’s law states that $I / I = k$. If the Weber’s fraction for judging taste is $1/5$, and the standard stimulus is a solution that has 10 milliliters of vinegar added to a liter of water, then a person should be barely able to distinguish between the 10 milliliter solution and which of the following solutions?
   a. 2 milliliters/liter of water
   b. 12 milliliters/liter of water
   c. 11 milliliters/liter of water
   d. 20 milliliters/liter of water
7. Briefly distinguish between the three classical methods of psychophysics, as developed by Fechner. Which of these methods is most like the method of signal detection (say why)? How does this method differ from signal detection? [5 pts]

8. Although several similarities exist between auditory processing and visual processing, identify the characteristic that the two types of processing do not have in common:
   a. organization of the neurons in the respective systems
   b. cells that are specialized to respond to certain features of stimuli
   c. lateral inhibition at the receptor level
   d. maps represented in the superior colliculus

9. Lateralization refers to the phenomenon that sounds
   a. appear to come from the side, rather than from directly ahead.
   b. heard through headphones appear to shift within our heads rather than outside.
   c. appear to shift back and forth, like a lateral in football.
   d. are difficult to localize when they fall within the cone of confusion.
10. Use the figure above to label the parts of the inner ear shown below:
   _____ Outer Hair Cells  _____ Tympanic Canal
   _____ Inner Hair Cells  _____ Cochlear Duct
   _____ Reissner’s Membrane  _____ Vestibular Canal
   _____ Basilar Membrane  _____ Tectorial Membrane

11. If a person were missing the organ of Corti in both ears, what would this person’s auditory perception be?
   a. Only high-frequency tones could be heard.
   b. Only low-frequency tones could be heard.
   c. Nothing could be heard.
   d. As long as the auditory nerve was intact, hearing would be normal.

12. The function of the inner hair cells of the inner ear is to
   a. filter out particles of dirt and other small objects that could damage the structure of the inner ear.
   b. transmit auditory information to higher levels of processing.
   c. provide a protective covering for the auditory receptors.
   d. help overcome the impedance mismatch problem.

13. _______________ is the smallest amount of energy required for the stimulus to be reported 50% of the time.
   a. The ascending method of limits
   b. The absolute threshold
   c. The adaptation level
   d. The criterion
14. Match the labels from the figure above to each of the following parts of the auditory system:

- Pinna
- Cochlea
- Eardrum
- Stapes (Stirrup)
- External Auditory Canal
- Contains the Organ of Corti
- Round Window
- Malleus (Hammer)
- Eustachian Tube
- Incus (Anvil)
- Oval Window
- Auditory Nerve

15. Match the labels from the figure above to each of the following descriptions:

- Important for localization
- Amplifies some frequencies through resonance
- Important for equalizing air pressure in the auditory system
- Membrane that pushes in on fluids in the vestibular canal
- Membrane at the end of the tympanic canal
- Important for maintaining balance

16. Pure tones produce phase differences between the two ears that are most detectable for
   a. low frequency sounds
   b. high frequency sounds
   c. low amplitude sounds
   d. high amplitude sounds
17. Why was categorical perception research thought to support the Special Mechanism account of speech perception? What categorical perception research undercut that support and provided support for the General Mechanism account of speech perception? [5 pts]

18. Why is the cone of confusion a problem for localization?
   a. The head is large enough that it creates interaural time differences.
   b. The head is large enough that it creates phase differences.
   c. High frequency tones especially lead to interaural intensity differences.
   d. All sounds originating from this area have the same interaural differences.

19. Which brain structure is thought to be crucial in sound localization?
   a. the superior olivary nucleus
   b. V5
   c. the lateral geniculate nucleus
   d. Area 17 of the cerebral cortex
20. The two phonemes /b/ and /p/ differ from each other in
   a. place of articulation.
   b. manner of articulation.
   c. dynamics.
   d. voicing.

21. According to the motor theory of speech perception,
   a. humans are able to connect the auditory stimuli they hear with the way these
      sounds are produced by the speaker.
   b. the way we perceive speech is analogous to the operation of the motor of a car.
   c. babies develop speech perception at about the same time they develop fine
      motor coordination.
   d. we make barely audible noises in our throats when we listen to another
      person speaking.

22. Your textbook showed a figure with one probability distribution representing “Noise”
    and one representing “Signal + noise.” In this kind of figure, a very sensitive observer
    would be represented by
   a. two completely overlapping probability distributions.
   b. a criterion line at the extreme right of the figure.
   c. two probability distributions that overlap very little.
   d. a criterion line at the extreme left of the figure.

23. Research on timbre in music has demonstrated that
   a. a musical tone sounds the same, whether it is played normally or backwards.
   b. the decay segment of a tone doesn’t seem to be useful in identifying the timbre of
      a tone.
   c. the attack segment of a tone doesn’t seem to be useful in identifying the timbre of
      a tone.
   d. a musical tone is uniform in musical quality throughout its duration.

24. A receiver operating characteristic (ROC) curve shows
   a. the relationship between d’ and criterion.
   b. the relationship between sensitivity and false alarm rate.
   c. the number of correct rejections a typical observer might make.
   d. the relationship between the probability of a hit and a false alarm.