

**UNIVERSITY OF BRITISH COLUMBIA**  
**PSYC 304 - SECTION 901: BRAIN AND BEHAVIOUR**

**DECEMBER EXAM, December 7, 2012**

INSTRUCTOR'S NAME: Steven Barnes

Time: 180 minutes

NAME: \_\_\_\_\_  
Please Print

Marks: 68

STUDENT NUMBER: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

**The exam consists of 2 items: (1) this 24-page question booklet, and (2) a separate SCANTRON sheet. You must hand in both items to an invigilator when you are finished writing the exam.**

**Please be sure to write your name and student number on this page and on the SCANTRON sheet. Also, please sign this page.**

**This question booklet has three parts. The first part consists of 42 multiple-choice questions. The second part consists of 4 two-mark short-answer questions. The third part consists of 3 ten-mark essay questions. Please carefully read the instructions for each part of the exam before you begin answering any of the questions.**

**PART I: MULTIPLE CHOICE QUESTIONS. Instructions: Choose the single best response to each of the following 42 questions. Use the Scantron sheet to record each of your answers (42 marks).**

1. Repetition priming tests are tests of
  - a. explicit memory.
  - b. **implicit memory.**
  - c. episodic memory.
  - d. semantic memory.
  - e. consolidated memory.
  
2. Despite general cortical thinning in cases of Williams syndrome, the thickness of the \_\_\_\_\_ cortex is often normal, or even greater than normal.
  - a. orbitofrontal
  - b. dorsolateral frontal
  - c. **superior temporal**
  - d. posterior parietal
  - e. both a and b
  
3. The disruptive effects of early total visual deprivation of the left eye on subsequent vision through the left eye are greater when the
  - a. right eye is deprived at the same time.
  - b. deprivation occurs later in childhood.
  - c. **right eye is not deprived at the same time.**
  - d. both a and b
  - e. both b and c
  
4. Adult neurogenesis produces cells that
  - a. become pyramidal neurons in the amygdala.
  - b. become neurons in the dentate gyrus.
  - c. become interneurons in the olfactory bulb.
  - d. both a and b.
  - e. **both b and c.**

5. Which of the following has played a major role in differentiating neurons that respond to pitch from those that respond to frequency?
- missing fundamentals
  - primary auditory cortex
  - tinnitus
  - barn owls
  - posterior auditory pathway
6. Light is being reflected from your toothbrush on to your left temporal hemiretina. Visual information about your toothbrush would be processed in your
- right lateral geniculate nucleus (LGN).
  - left primary visual cortex.
  - right primary visual cortex.
  - all of the above.
  - both a and c.
7. Connections between various areas of visual cortex are almost always
- unidirectional.
  - excitatory.
  - reciprocal.
  - inhibitory.
  - serial.
8. The reaction that transduces light into an electrical signal in rods is the
- bleaching of rhodopsin by light.
  - elicitation of action potentials in rods.
  - elicitation of action potentials in cones.
  - inhibition of action potentials in rods.
  - both a and b
9. Computed tomography (CT)
- is a functional imaging method.
  - is a contrast x-ray technique.
  - requires the use of a radio-opaque dye.
  - is the method of choice for imaging the cerebral arteries.
  - none of the above.

10. Most of the cell death associated with early development of the brain is
- a. necrotic.
  - b. passive.
  - c. apoptotic.
  - d. both a and b.
  - e. both b and c.
11. Normally, a male rat cannot intromit unless
- a. it is by itself.
  - b. it displays lordosis.
  - c. the female displays lordosis.
  - d. the female has a low lordosis quotient.
  - e. it first ejaculates.
12. Current evidence suggests that some cases of blindsight may be mediated by
- a. surviving islands of primary visual cortex.
  - b. ascending pathways to secondary visual cortex that do not involve primary visual cortex.
  - c. subjective contours.
  - d. both a and b
  - e. both b and c
13. Prior to migraine attacks, many sufferers experience
- a. headaches.
  - b. seizures.
  - c. fortification illusions.
  - d. motion aftereffects.
  - e. agnosia.
14. Lesions that are commonly referred to as amygdala lesions often
- a. damage brain structures other than the amygdala.
  - b. do not destroy the entire amygdala.
  - c. damage the dorsolateral prefrontal cortex.
  - d. both a and b
  - e. both b and c

15. In humans, all of the visual receptors are in the
- last layer of the retina to be reached by light entering the eye.
  - first layer of the retina to be reached by light entering the eye.
  - cornea.
  - middle layer of the retina.
  - optic disk.
16. With respect to the visual system, a high degree of neural convergence is to a low degree of neural convergence as
- low acuity is to high acuity.
  - high sensitivity is to low sensitivity.
  - photopic is to scotopic.
  - parvocellular is to magnocellular.
  - both a and b
17. If a researcher wanted to predict the response of a visual system neuron to any one of many stimuli, it would be best for that researcher to determine the receptive field (RF) of that neuron using
- bars of light.
  - natural stimuli.
  - sine wave gratings.
  - circles of light.
  - surround suppression.
18. Both ibotenic acid and kainic acid
- are neurotoxins.
  - destroy neurons whose cell bodies are at the tip of an intracerebral cannula, while leaving axons passing through the region undamaged.
  - are selective dopamine antagonists.
  - both a and b
  - both a and c

19. Unlike other electrophysiological methods of recording neural activity, intracellular unit recording provides measurements of

- a. cell firing.
- b. action potentials.
- c. the membrane potential.
- d. reductions in neural firing.
- e. EEG activity.

20. Studies that have examined the effects of modulating neurogenesis on learning and memory have

- a. used antimetabolic drugs.
- b. not produced any consistent pattern of effects.
- c. shown that hippocampal neurogenesis plays an important role in learning and memory.
- d. both a and b
- e. both a and c

21. The conventional five-taste component processing theory of taste has a problem:

- a. There are no receptors for bitter or sweet.
- b. There are only four primary tastes.
- c. Many tastes cannot be created from combinations of the primaries.
- d. all of the above
- e. both b and c

22. The periaqueductal gray (PAG)-raphé-dorsal-column circuit has been hypothesized to mediate

- a. some types of pain.
- b. some types of analgesia.
- c. touch.
- d. audition.
- e. stereognosis.

23. In some ways, neural development seems to operate on the following principle:
- a. **survival of the fittest.**
  - b. all for one and one for all.
  - c. what's good for the goose is good for the gander.
  - d. there is no time like the present.
  - e. the exception proves the rule.
24. All of the olfactory receptors with the same receptor protein
- a. are located in the same part of the mucosa.
  - b. are scattered throughout the mucosa.
  - c. project to the same location of the olfactory bulb.
  - d. both a and c
  - e. **both b and c**
25. Lesions that are restricted to primary somatosensory cortex produce two sorts of contralateral deficits:
- a. **a reduced ability to detect light touch, and a deficit in stereognosis.**
  - b. a reduced ability to detect painful stimuli, and a deficit in stereognosis.
  - c. a reduced ability to detect light touch, and a deficit in the ability to detect cold stimuli.
  - d. simultanagnosia and amusia.
  - e. a reduced ability to identify objects by touch and by sight.
26. Each cortical level of a sensory system - primary, secondary, or association - is itself composed of different areas that mediate different psychological processes. This principle of sensory system organization is referred to as
- a. **functional segregation.**
  - b. parallel processing.
  - c. the binding problem.
  - d. hierarchical organization.
  - e. serial processing.

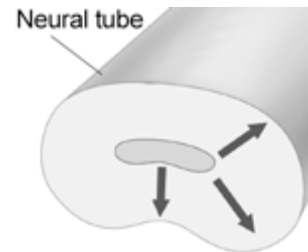
27. A core symptom of autism is
- reduced ability to detect emotions and intentions of others.
  - reduced capacity for social interaction.
  - tremor at rest.
  - all of the above
  - both a and b
28. The semicircular canals are the receptive organs of
- the auditory system.
  - the vestibular system.
  - a top-down system .
  - an exteroceptive system.
  - both a and c
29. Fluorodeoxyglucose (FDG) is
- commonly used in functional magnetic resonance imaging (fMRI).
  - best served on toast, with a cup of tea.
  - commonly used in positron emission tomography (PET).
  - commonly used to label new cells in the adult mammalian central nervous system.
  - none of the above.
30. One exception to the usual tonotopic organization of the auditory system is the
- primary auditory cortex.
  - basilar membrane.
  - superior colliculus.
  - inferior colliculus.
  - cochlear nucleus.
31. Which of the following is one of the assumptions of the *paired image subtraction technique*, a technique commonly employed in functional magnetic resonance imaging (fMRI) studies?
- temporal resolution
  - component processes
  - constituent cognitive processes
  - additivity
  - more than one of the above

32. Outer hair cells rest on
- the basilar membrane and are attached to the tectorial membrane.
  - the tectorial membrane and are attached to the tympanic membrane.
  - the tympanic membrane.
  - the inner hair cells.
  - the ossicles.
33. Simple images that are stabilized on the retina
- vibrate.
  - continually disappear and reappear.
  - change shape.
  - increase in brightness.
  - appear to move towards the foveal region.
34. In contrast to the “where” vs. “what” theory, Goodale and Milner have argued that the respective functions of the dorsal and ventral streams are
- “what” vs. “where.”
  - “conscious perception” vs. “control of behaviour.”
  - “control of behaviour” vs. “conscious perception.”
  - both a and b
  - both a and c
35. Signal averaging is commonly used in the recording of event-related potentials (ERPs) because it reduces the magnitude of the
- colour aftereffect.
  - sensory evoked potentials.
  - background noise.
  - P300.
  - far-field potentials.
36. It is now generally acknowledged that adult brains are
- set in their ways.
  - capable of major adaptation.
  - not as plastic as developing brains.
  - both b and c
  - none of the above

37. On the basis of their receptive field properties, the neurons in lower layer IV of the primary visual cortex are classified as
- simple cells or complex cells.
  - complex cells.
  - simple cells.
  - on-center or off-center cells.
  - on-center cells.

38. The pattern of neural migration indicated by the arrows in this illustration is

- radial.
- tangential.
- inside out.
- outside in.
- posterior.



39. Eyes and optic tectums grow at different rates. As they grow, the synaptic connections that were originally formed on the tectum by axons of retinal ganglion cells shift so that the retina is always fully and faithfully mapped on the tectum. This finding supports the
- chemoaffinity hypothesis.
  - pioneer hypothesis.
  - topographic-gradient hypothesis.
  - all of the above
  - both a and c

40. Posterior parietal cortex is considered to be

- association cortex.
- primary olfactory cortex.
- primary visual cortex.
- primary auditory cortex.
- secondary somatosensory cortex.

41. Light presented in the periphery of the receptive field of an on-center cell will
- a. decrease the firing of the cell until the light is turned off.
  - b. increase the firing of the cell until the light is turned off.
  - c. briefly inhibit the firing of the cell right after the light is turned off.
  - d. prevent all firing of the cell until the light is turned off.
  - e. two of the above.
42. Electrooculography is a technique for monitoring
- a. penile engorgement.
  - b. cortical activity.
  - c. blood pressure.
  - d. eye movement.
  - e. muscle tension.

**PART II: SHORT-ANSWER QUESTIONS. Instructions: Answer only 3 of the following 4 questions in the space provided. Your answer should not be in point form. Be sure to make it clear to the marker which 3 questions you chose to answer. (6 marks)**

1. What is *change blindness*? How can this phenomenon be demonstrated in a laboratory setting? (2 marks)

2. In the context of studies of adult neurogenesis, explain the key difference between bromodeoxyuridine (BrdU) and tritiated thymidine. Why would one choose to use BrdU over tritiated thymidine? (2 marks)

3. Briefly summarize how a change in the activity of a brain area becomes a signal that is detectable by a magnetic resonance imaging machine. (2 marks)

4. What is the difference between a non-classical receptive field (nCRF) and a classical receptive field (CRF)? Use one of the examples presented in class to illustrate the difference. (2 marks)

**PART III. ESSAY QUESTIONS. Instructions: Answer only two of the following three questions. Your answer should not be in point form. Feel free to use both sides of the subsequent pages to answer your chosen questions. Please use headings to organize your answers. Be sure to make it clear to the marker which 2 questions you chose to answer. (20 marks)**

1. In class, you learned about several problems involved in the interpretation of lesion studies. Of those problems, choose four that you believe are most significant. Explain and discuss each of your four choices, being sure to explain why you think they are so troublesome. (10 marks)
2. Sensory systems are not isolated from each other, despite the fact that biopsychologists usually study them that way. Discuss this tendency to study sensory systems in isolation, and what the implications of that tendency are for our goal of understanding sensation and perception. As part of your discussion, provide at least two examples from the lectures and/or text of the interaction between sensory systems. (10 marks)
3. Since the last midterm exam, the text and lecture materials have presented many examples of plasticity in the adult mammalian central nervous system. Begin your essay with a brief definition of 'neuroplasticity.' In the body of your essay, choose three examples of adult neuroplasticity that you believe are particularly significant and/or interesting. Describe each example, being sure to explain why you believe it to be an important example of neuroplasticity. End your essay with some general conclusions about the nature and/or significance of adult neuroplasticity. (10 marks)