Study Guide for Unit 1 (Psyc 2022)

This review guide is formatted such that the questions will be similar to what you will find on the short-essay test. The answers to these questions are either from class overheads, or in the assigned reading material.

1. Define the following in terms of brain-"mind" relationships: dualism, monism, and materialism.
2. What was George Berkely's (1685-1753) solution to the brain-mind relationship problem?

Historical overview:
1. What early clue (7000 years ago) suggests that hominids believed in a relationship between mind and brain?
2. What was Hippocrates view on the role of the brain?
3. For the Romans, what was the role of humors as far as nerves were concerned?
4. Descartes' view of the brain-mind relationship was dualist. What was his theory of brain function and mind?
5. Which organ of the body was proposed by Descartes to be controlled by the mind?
6. What did Galvani and Du Bois-Reymond discover?
7. Who were the first to demonstrate distinct sensory and motor functions of the nervous system?

Cortical Anatomy:
1. What percent of the human brain consists of cortex?
2. How many neurons are estimated to make up the cerebral cortex?
3. How many synapses are estimated to be made in the cerebral cortex?
4. Approximately how thick is the neocortex in humans?
5. Why is cortex referred to as "gray matter"?
6. What is the difference between a gyrus and a sulcus?
7. What is the difference between a sulcus and a fissure?
8. Which brain regions are separated by the following fissures: longitudinal fissure, lateral (Sylvian) fissure, transverse fissure?
9. What are the boundaries for the frontal, parietal, temporal and occipital lobes?
10. Where is the insula (insular lobe)?
11. What is the localization of function debate?
12. What are some examples of localization of function?
13. What contribution did the following individuals make to the localization of brain function debate: the phrenologists, Pierre Flourens, Paul Broca, Karl Wernicke, Karl Lashley, Wilder Penfield?
14. Describe the procedure that Penfield used to "map" out the function of the sensorimotor strip.
15. What are the 6 features of Penfield's sensorimotor strip?
16. What is a "homunculus"?
17. Which part of the body is represented by the pre and post central gyrus in the longitudinal fissure?
18. Which region of the body has a more inferior representation on the lateral surface of the sensorimotor cortex: the hand or the face?
19. Why does electrical stimulation of the precentral gyrus in the left hemisphere result in muscle contractions on the right side of the body?
20. Why does electrical stimulation of the precentral gyrus result in muscle contractions, whereas electrical stimulation of the postcentral gyrus result in the perception of a "tingling" sensation in the body?
21. How does the amount of sensorimotor cortex that is directly connected to various parts of the body affect motor and somatosensory function?
22. What sulcus is in the middle of the primary visual cortex?
23. Where is the primary auditory cortex located?
24. Where are the following cortical regions located: superior frontal gyrus, middle frontal gyrus, inferior frontal gyrus, pars orbitalis, pars triangularis, pars opercularis, precentral gyrus, postcentral gyrus, superior parietal lobule, inferior parietal lobule, supramarginal gyrus, angular gyrus, insula, transverse temporal gyri of Heschl, planum temporale, superior temporal gyrus, middle temporal gyrus, inferior temporal gyrus, cingulate gyrus, superior temporal sulcus, calcarine sulcus, Sylvian fissure, sulcus of Rolando?

Cortical Organization and Cellular Structure:
1. Differentiate between primary, secondary and tertiary cortex in terms of: 1) degree of direct sensory input or motor output; 2) degree of multi-modal sensory input.
2. What is "association" cortex?
3. How many "layers" does neocortex have?
4. What are pyramidal cells, aspiny stellate cells and spiny stellate cells?
5. Distinguish between apical dendrites, basilar dendrites and dendritic spines (draw).
6. What is the functional significance of dendritic spines?
7. Which type of cortical neurons are projection neurons?
8. Which type of cortical neurons are interneurons?
9. In which cortical cell layer(s) are pyramidal cells located?
10. In which cortical cell layer(s) are spiny stellate cells found in especially high concentrations?
11. Do pyramidal cells have an excitatory or inhibitory effect on their target neurons?
12. What neurotransmitter is released from the axon terminals of pyramidal cells?
13. Do spiny stellate cells have an excitatory or inhibitory effect on their target neurons?
14. What neurotransmitter is released from the axon terminals of spiny stellate cells?
15. Do aspiny stellate cells have an excitatory or inhibitory effect on their target neurons?
16. What neurotransmitter is released from the axon terminals of aspiny stellate cells?
17. What is meant by the statement that the cortex is organized into “columns”? 
18. Describe the general cellular features of each of the 6 cortical layers.
19. Which cortical layer(s) receives the majority of input from sensory afferents?
20. Which cortical layer(s) receives the majority of “non-specific” input?
21. Give an example of a source of non-specific input to the cortex.
22. What are association afferents and efferents?
23. What are callosal afferents and efferents?
24. Where do pyramidal neurons in cortical cell layers II, III, V, and VI project to?
25. What is the difference between the postcentral and precentral gyrus in their relative thickness of cortical layers IV and V? Why?

Cortical Processing of Language:
1. Where is Broca’s area located?
2. Where is Wernicke’s area located?
3. What is the classic description of Broca's aphasia?
4. What is the classic description of Wernicke's aphasia?
5. What is "laterality of function"?
6. True or False. Language function is localized in the left hemisphere in a majority of individuals.
7. What is one method that we can use to determine the language "dominant" hemisphere of a particular person?
8. What are 2 examples of functional evidence suggesting that on average language is localized in the left hemisphere?
9. What is one example of anatomical evidence suggesting that on average language is localized in the left hemisphere?
10. What is the planum temporale?
11. What is the role of the planum temporale in language processing?

Parietal Lobe Function:
1. What "visual stream" projects to the parietal lobe?
2. How does the parietal lobe utilize this visual information (i.e. what aspect of visual information is "provided" to the parietal lobe)?
3. What are 3 general anatomical regions of the parietal lobe and what is the overall functional specialty of each of these 3 areas?
4. What are some general differences in specialization of function between the left and right hemispheres of the parietal association (posterior) cortex?
5. Describe how the parietal lobe has a role in motor activity.
6. What is agnosia?
7. What are tactile agnosia, asomatognosia, anosognosia, and autotopagnosia?
8. Parietal lobe damage to which hemisphere usually results in finger agnosia?
9. What is contralateral neglect?
10. Which area of the brain (including hemisphere) is probably damaged with contralateral neglect?
11. What is apraxia?
12. What are ideomotor apraxia, ideational apraxia, and constructional apraxia, and which brain region (including hemisphere) would you predict has been damaged for each of these disorders?
13. What are 4 symptoms of Gerstmann's syndrome?
14. Damage to which brain region is likely to lead to Gerstmann's syndrome?
15. What are 3 symptoms of Balint's syndrome?
16. Damage to which brain region is likely to lead to Balint's syndrome?

Temporal Lobe Function:
1. What "visual stream" projects to the temporal lobe?
2. How does the temporal lobe utilize this visual information (i.e. what aspect of visual information is "provided" to the temporal lobe)?
3. Describe 4 different anatomical cortical regions within the temporal lobe, and list a general functional correlate for each of these regions.
4. What happened when Wilder Penfield stimulated the ventral-medial surface of temporal lobe association cortex of his patients?
5. What are some examples of laterality of function in the temporal lobe?
6. What is tonal agnosia, and damage to what brain region is likely to result in tonal agnosia?
7. What is visual object agnosia? Where is the likely site of damage?
8. What is visual agnosia for drawing? Where is the likely site of damage?
9. What is prosopagnosia? Where is the likely site of damage?
10. What does the split face exercise tell us about laterality of hemispheric processing of facial recognition?

**Frontal Lobe Function:**
1. What percent of total cortical surface area in humans consists of frontal lobe association cortex?
2. Around what age in humans does the development of the frontal lobe connections reach completion?
3. Describe in functional terms 5 different cortical regions within the frontal lobe.
4. What is the overall general functional relationship between prefrontal cortex, premotor cortex and motor cortex?
5. What are 5 general symptoms of frontal lobe damage?
6. What is perseveration?
7. What is an example of divergent thinking?
8. What is an example of working memory?
9. What type of environmental control of behavior dysfunctions might be observed after frontal lobe damage?
10. What region of frontal lobe when damaged often leads to inappropriate social behavior?
11. What effect does temporal lobe damage typically have on IQ test performance?

**Oliver Sacks Cases:**
What kind of disorder did the following individuals have, and what were the likely regions of nervous system damaged?

a. "The Man Who Mistook his Wife for a Hat".
b. "The Man Who Fell out of Bed".
c. the individual described in "Eyes Right!".
d. the individual described in "Yes, Father-Sister".
e. the individual described in "Reminiscence".
f. the individuals described in "The President's Speech".