

## 9.14 Homework 6

Due before Lecture 33

NAME \_\_\_\_\_

Answer the first four items. The remaining six items, marked with asterisks, are optional and are worth extra credit. Alternatively, you may propose your own extra credit problem and solve it.

- 1) Instinctive aversive behavior in response to loud noise, and learned fear responses to specific sounds, depend on different ascending connections. Contrast the connections.
- 2) The brain uses much more energy than other organs of the body. How much energy does it use? Does this mean we use much more energy when we are doing difficult problem sets? How do humans compare with other mammals? Do a search on Google Scholar or Quertle, and also on Google, to find reliable answers. (Suggested initial search: “energy requirements, brain”) Note: In this case, Google will yield an answer that is briefer and easier to understand. Is it adequately reliable?
- 3) Recent experimental studies have indicated that hippocampal area CA2, often ignored in studies of function, may play a role in specific kinds of memory formation. Check the recent literature, find a convincing study of the role of CA2, and summarize it in a single paragraph.
- 4) Study diffusion tensor imaging (DTI) methodology using online searches. Then, find a study using this method to study white matter pathways, in humans, relevant to a topic in chapters 23 through 29 in the book. Summarize the major findings (about a half page).
- 5) \*\* Find evidence for delay lines in the connections of the hindbrain auditory system using searches of journal literature. (Possible searches: “medial superior olive” “hindbrain delay lines, auditory”) Summarize findings for one species in one paragraph, giving reference details.
- 6) \*\* Find a study of an echolocating bat auditory cortex published since 2010, and summarize results in one or two paragraphs. Be sure to give the reference details.
- 7) \*\* Summarize information on the subformical organ, one of the circumventricular organs. Include major connections, receptors for substances in the blood, functions. Use web searches. Limit your summary to one page or less.
- 8) \*\* Summarize axonal tracing studies (at least one report) of connections from hypothalamus direct to spinal cord. (Web searching required.)
- 9) \*\* Summarize axonal tracing studies (at least one report) of connections from spinal cord direct to the hypothalamus and basal forebrain structures. (Web searching required.)
- 10) \*\* Describe effects on brain development of a non-sexual hormone, e.g., a thyroid hormone. Do this by searching for recent articles on the web and summarizing a recent finding. Example searches: thyroid hormone and cerebellum development, thyroid hormone and cortical development, thyroid hormone and hippocampus development. Use papers published after 1999. Limit your summary to one page.

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## 9.14 Brain Structure and Its Origins

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