The Visual System
Exam 2
Spring 2003

Please be sure to put your name and ID# on each page.
(The pages will be separated for grading.)

Name: _____

ID#: _____

I pledge on my honor that I have not and will not give or receive aid on this examination.

SIGNATURE: _____

- Answer **only 10** of the 12 questions on this exam.
- Each question is worth 10 points.
- Plan to spend a maximum of 5 minutes on any one question.
- Please watch the time.
- *Best wishes!*

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(Bonds)

1). You are in front of Bill Frist. Argue for (or against) the support for development of visual prosthetics. Note that your grade will be entirely independent of the stand you take and based only on the coherence of your argument.

2). You are recording from an LGN cell in an iguana. How would you test whether the cell was spatiotemporally separable? What would you measure and on what aspects of the response would you base your conclusions?

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(Bonds)

3). The function of a cortical cell can be determined via testing with a regimen of harmonically pure stimuli (gratings) or by discrete visual structures ("features") such as spots, bars, angles, etc. Which would you choose to figure out how cortical cells participate in the process of vision, and why? There is no correct answer, but your grade will depend on the strength of your argument.

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(Casagrande)

4). Several methods have been used to classify cells within the visual system. Describe three methods and how these methods have been used to distinguish between two classes of cells. Name the cells you are using in your example and be specific about the methods used to distinguish between them.

5). Describe how the cells and circuits connecting them within the lateral geniculate nucleus (LGN) can regulate the transfer of visual information from retina to cortex.

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(Casagrande)

6). How is the visual field represented topographically within the primary visual cortex?

7). What do developmental neurobiologists mean by a cell is "born"? In what temporal order are the cells belonging to different layers of visual cortex born?

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(Casagrande)

8). Is myopia caused by genetics or environment (visual experience)? Explain and give examples to support your answer.

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(Noelle)

9). A rational analysis of the problem of representing natural visual scenes using an encoding that is minimally redundant suggests that primary visual cortex may be particularly well adapted to produce such efficient representations. According to such a computational analysis, what sort of visual features should these cortical cells detect? What *statistical relationship* should exist between these visual features in order to ensure a representation of visual scenes with minimal redundancy?

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(Schall)

10). What are the criteria for defining an extrastriate visual area?

11). How does the brain produce saccadic eye movements?

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Schall

12). How does the brain select the target for saccades?