

Read each question carefully and answer it completely. Each multiple-choice question is worth one point. For other questions, the point value is noted. Remember, I think of a point as a minute, so you should expect to spend, for example, roughly 5 minutes on a 5-point question. Keep your eyes foveated on your own exam. The Skidmore Honor code is in effect, and I'll have a sheet for you to sign at the conclusion of the exam. Good Luck!!

Answer each essay question (neatly) on the lined paper provided. Don't feel that you need to answer in perfect prose, you can use an outline, diagrams, etc. What is crucial is that your answer is complete and clear. Each essay is worth 20 points.

Essay 1. Describe the evidence to support the idea that we effectively have two completely different visual systems in our retinas (duplex or duplicity theory). Use evidence from psychological, physiological, and anatomical approaches.

Essay 2. Describe some cues to the perception of depth. Distinguish between monocular and binocular cues, and describe the conditions under which a person with only one eye is at no disadvantage to a person with two good eyes as far as depth perception goes. Why are Julesz's random dot stereograms important?

1. What is one reason that the eye becomes more sensitive to light as time passes during dark adaptation?
 - a. Because the pupil constricts, letting in less light.
 - b. Because the dark-adapted eyes have a higher concentration of rhodopsin.
 - c. Because the dark-adapted eyes have a lower concentration of rhodopsin.
 - d. Because the cornea becomes more sensitive to light.
2. Briefly explain Mach's book, focusing particularly on what it tells us about lightness perception. (5 pts.)

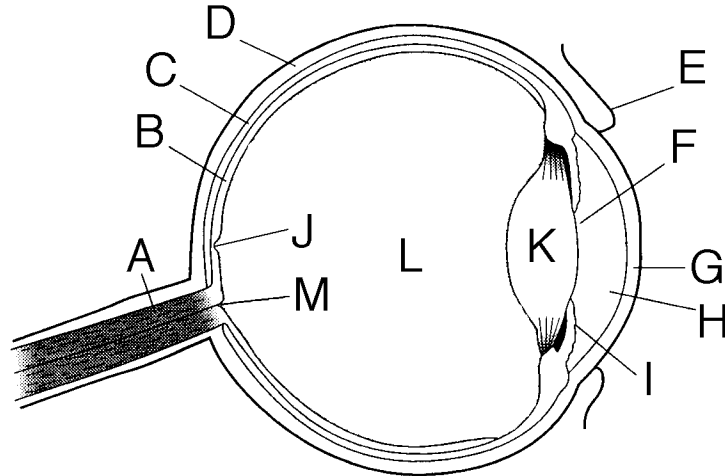
3. What do observers report when they look at a stabilized retinal image?
 - a. Their acuity improves.
 - b. The contrast within the image grows stronger.
 - c. They become light adapted.
 - d. The image disappears.

4. What does *retinotopic* mean?
 - a. The retina is located at the back of the eye.
 - b. The retina is light sensitive.
 - c. Neurons that receive information from neighboring areas on the retina are near each other in the visual cortex.
 - d. The receptors on the retina are arranged so that the receptor-to-ganglion ratio is higher for rods than for cones.

5. Research on lateral inhibition in the Limulus showed that when light was presented at Point A, the electrical activity at nearby Point B
 - a. was unaffected.
 - b. decreased.
 - c. increased.
 - d. rapidly increased, and then decreased to below-normal level.

6. When your eyes move from one location to the next as you read this question, they are making a
 - a. fixation.
 - b. vergence movement.
 - c. gaze-contingent paradigm.
 - d. saccade.

7. Briefly describe the stages of shape perception postulated by the computational theorists.
[5 pts]



8. Match the appropriate letter from the above figure to the parts of the eye indicated below: [4 pts]

- | | | | |
|-------|------------|-------|-------------------|
| _____ | Retina | _____ | Anterior Chamber |
| _____ | Lens | _____ | Choroid |
| _____ | Optic Disc | _____ | Posterior Chamber |
| _____ | Sclera | _____ | Iris |
| _____ | Cornea | _____ | Pupil |
| _____ | Fovea | _____ | Optic Nerve |

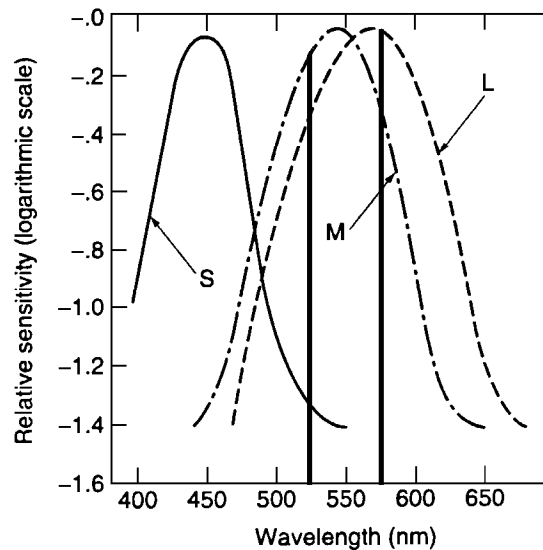
9. Match the appropriate letter from the figure to the descriptions indicated below: [6 pts]

- | | |
|-------|--|
| _____ | Lack of photoreceptors creates a blind spot. |
| _____ | Place where cataracts may occur |
| _____ | Floaters are found here |
| _____ | Astigmatisms occur here |
| _____ | Contains rods and cones |
| _____ | Responsible for bending most of the light entering the eye |
| _____ | Responsible for perceiving visual detail |
| _____ | Responsible for accommodation |
| _____ | Responsible for absorbing light not absorbed by the retina |
| _____ | Contains aqueous humor |
| _____ | Glaucoma occurs due to build up of fluid here |
| _____ | Glaucoma has its negative impact here |

10. Fourier analysis

- is identical to Fourier synthesis.
- allows us to determine the sine waves that make up a complex wave.
- allows us to combine sine waves to produce a complex wave.
- allows us to analyze a sine wave into even simpler waves.

11. What is the evidence for the trichromatic theory of color vision? What role does additive color mixing play in this approach? [6 pts]



12. Use the above figure to answer the following questions [2 pts]:
(One vertical line represents a light of about 525 nm and the other a light of about 575 nm.)
- Which light creates more activity in the M cone system?
 - Which light creates more activity in the L cone system?
 - Which light creates more activity in the S cone system?
 - A metamer of a 525 nm light would most likely need what proportions of blue, green, and red light?

13. Which statement best summarizes current color vision theory?
- a. Trichromatic theory, by itself, explains color vision.
 - b. Opponent-process theory, by itself, explains color vision.
 - c. Trichromatic theory operates at the receptor level; opponent-process theory operates at higher levels of processing.
 - d. Opponent-process theory operates at the receptor level; trichromatic theory operates at higher levels of processing.

14. In examining shape perception, we looked at a number of unusual stimuli (e.g., multistable images, upside-down figures, subjective contours, impossible figures). Briefly describe two of these unusual figures and then tell me how they inform our understanding of shape perception. [5 pts]