# Computation in biological systems: biological and computational vision
## Exercise 2

1) No photoreceptors are located in the retinas' optic disks. Why aren't we blind in the part of the visual field that falls on the optic disk?

*filling in: percept is partially inferred internally, so that we simulate the missing spot from surrounding information, also the two other discs dont point in the same direction, so the other fills out*

2) True or False: the right hemisphere treats visual information from the left eye and vice-versa.

*false: the right hemisphere treats information from the left visual field of both eyes and vice versa*

3) Describe the basic structure of the eye, from the cornea to the optic nerve.

*also rod vision does not have a good resolution, so you cant really read and also sparsely distributed*

4) Moonlight is good for romance. But can one read a newspaper? Can one see colors? Explain why or why not.

*low light intensity makes it more difficult to see contrasts. maybe if one was to point its newspaper directly against the moonlight to increase contrast it would work.*

*color vision: reduced, since dark adaption is more prominent, but moonlight is also bright enough to make us perceive colors*

*s cone: high activity (most sens around 420nm)*
*m cone: also active*
*l cone: depends on intensity - if intense enough from midrange waves there will also be signaling*

5) A novel kind of plastic reflects light only (and equally) at wavelengths of 450, 500 and 600 nm (and not at all elsewhere). You illuminate it with a special techno dance club light, that emits a flat spectrum between 400 and 550 nm (and zero elsewhere). What are the approximate relative L, M and S cone responses to this stimulus?

6) You look at your best friend. He is pretty square (top). The reflectances of his mouth, nose, eyes and skin are 50%, 60%, 10% and 90%. One of your ganglion cells is very linear. It is OFF-center, and has gain –1.0 in the center pixel and +0.1 in the 8 surrounding pixels (middle). As you move your eye around, you place that ganglion cell in the three positions indicated here (bottom).

*i dont understand the question: where are the per centages located in the square box, and what does top etc. mean and the arrows?*



*thats the friend*

A) If you turn on a 100W light, what are the responses of the ganglion cell in those three positions? *output ganglion cell: the sum of the 3x3 matrix (answer: 62)*

B) And if you turn on 10 times more lights?

C) Why were you able to answer question 1? Did you have to rely on the cell being linear? *yes*

D) How would you tell if a cell is not linear? *when the computational linear approach is incoherent with observed data sine wave as input and look if sine wave is also ouput (at same freq)*