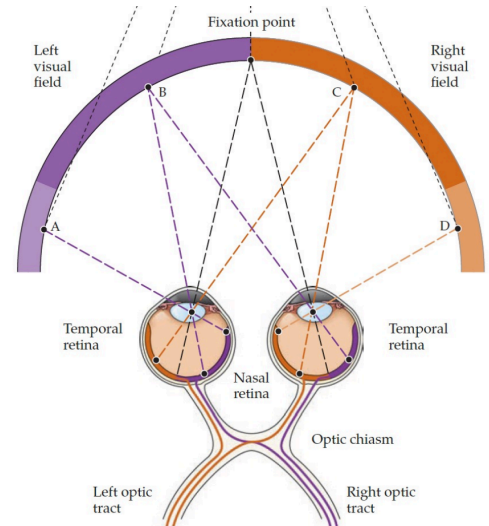
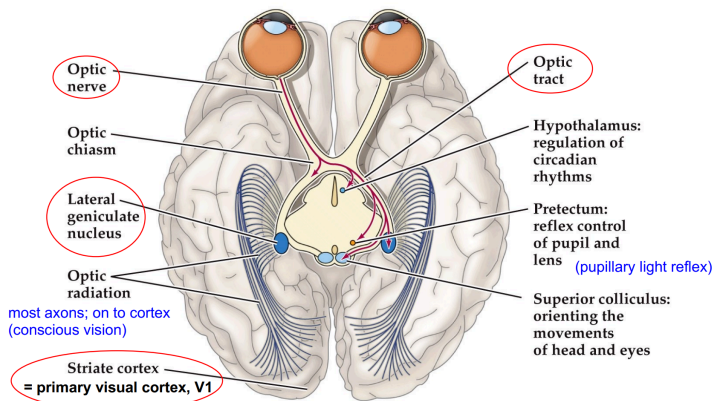


Neuroscience BIO-311 Mathis  
 Exercises - Solutions  
**Vision – System and Circuits**

- 1) i) Recapitulate in a drawing the principle of binocular field in human vision.
- ii) Add to your drawing the pathways carrying the information from the eye to the primary visual cortex V1
- iii) What part of the visual field of view would be impaired in the case of a section of the right optic nerve downstream of the optic chiasm?

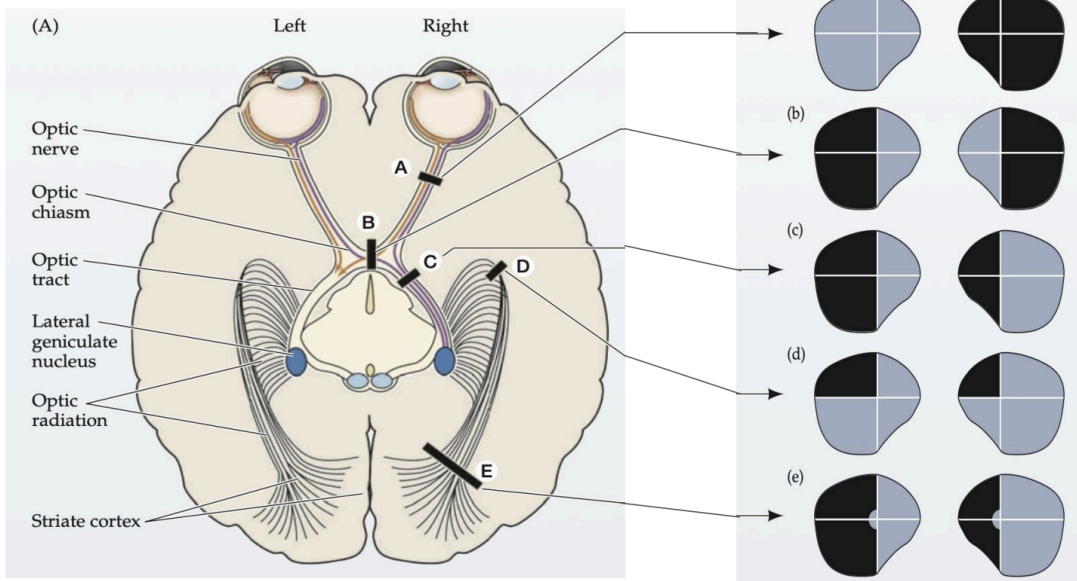
----- ANSWERS

i and ii)



iii) The entire left visual field

**Visual Field Deficits - Retinotopy**

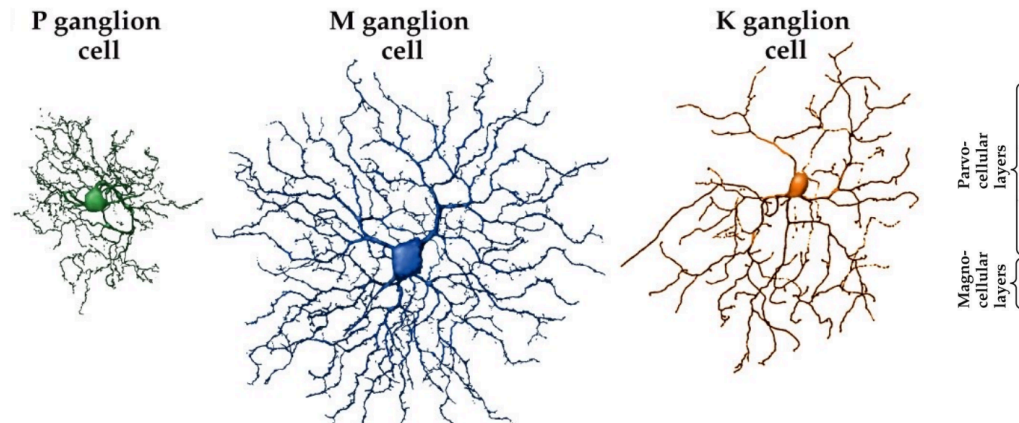


- 2) i) Name three cell types in the lateral geniculate nucleus  
 ii) What are the properties and specificities of these cells ?  
 iii) Which features of the real world do they allow to detect?

i)

- Magnocellular cells (M-cells)
- Parvocellular cells (P-cells)
- Koniocellular cells (K-cells)

ii)



- inputs from relatively few rods and cones
- slow conduction velocity
- respond to changes in color
- respond only weakly to changes in contrast

- inputs from relatively many rods and cones.
- fast conduction velocity
- respond to low-contrast stimuli
- not very sensitive to changes in color.

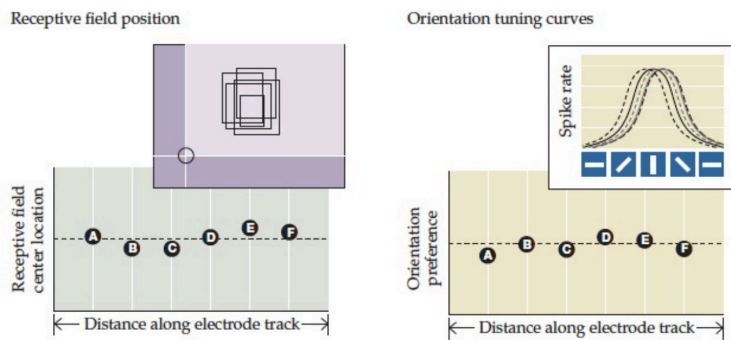
- Newly discovered, only 10%
- inputs (intermediate) from rods and cones.
- Likely involved in color
- Large receptive field

iii)

- P-cells mainly focus on spatial resolution such as detailed analysis of shape, size, color of an object
- M-cells focus on high temporal resolution such as speed and location of an object moving quickly
- K-cells process color



ii) Neurons in the same column (along radial axis of the cortex) have receptive fields that are centered on the same region (left panel) of visual space and exhibit similar orientation preferences (right panel).



Neurons in the oblique case have receptive fields which center on a slightly larger spread of regions (left panel) and orientation preferences (right panel) that shift in a progressive fashion.

