1. How does light cause a change in membrane potential in photoreceptors? Go through the entire transduction cascade. Know what would be changed if various steps were blocked or inhibited (for example: if the phosphodiesterase is blocked, what happens to the light signal?).

2. Describe the two synapses from a cone to bipolar cells. How does one bipolar cell invert the signal from the cone while another bipolar cell that is post-synaptic to the same cone not invert the signal?

3. Pick an on-center or off-center ganglion cell. Describe what happens as an edge of black moves over this cell and its receptive field. What is the contribution to action potential frequency from the center cells, and what is the contribution from the surround cells?

4. Which retinal neuronal type projects the retinotopic field centrally? Different classes of these cells carry different types of visual information: where are these types of information segregated in what anatomical structure? Describe the segregation of eye inputs in the cortex as well.

5. How do stereocilia on hair cells transduce sound and cause ion channel opening? Why does $K^+$ go into the cell and depolarize it? How do different hair cells have membrane oscillations at different frequencies (in response to stimuli of different frequencies).

6. How is the CNS organized tonotopically? Why is input from the two ears mixed at such an early point in the auditory central pathway? How does that compare to the visual system?

7. If a voluntary movement arises by a burst of activity in motor cortex, trace how resulting changes in neuronal firing in the direct pathway through the basal ganglia would help reinforce that motor command. A diagram would probably be helpful. How would the indirect pathway tend to balance out that movement and prevent it from happening when it’s unwanted?

8. Describe the role dopamine plays in regulating the initiation of movements. Describe the pathophysiology of Parkinson’s disease and how pharmacological and surgical therapies can work.

9. In up to 3 full sentences, define a central pattern generator.

10. Explain how the stretch reflex works. Use diagrams where appropriate, and full sentences.

11. What is the motor analog of tonotopy or retinotopy?