1. Next to each letter in the following list, write the name of the structure indicated in the figure (10 points)

A. CORPUS CALLOSUM
B. SEPTUM PELLICIDUM
C. CAUDATE NUCLEUS
D. INSULA
E. PUTAMEN
F. TEMPORAL LOBE (lobe)
G. GLOBUS PALCIDUS
H. NUCLEUS ACCUMBENS
I. CLAUSRUM
J. INTERNAL CAPSULE
K. INTERNAL CAPSULE

[Diagram of brain sections with labeled structures A through K]
III. MULTIPLE CHOICE. Circle ALL correct answers or completions. There may be one, more than one, or no correct completion for a given question. Think of these questions as multiple true-false; points are lost if a correct completion is not circled or an incorrect completion is circled. (70 points)

1. Unmyelinated (C) fibers in a peripheral nerve
   a. have their cell bodies in the dorsal root ganglia and synapse in the thalamus
   b. can release substance P from their terminals in the skin
   c. may have cutaneous endings with receptors sensitive to capsaicin, or to menthol
   d. are the axons with the smallest diameters and lowest conduction velocities
   e. sometimes have single cutaneous endings that respond to thermal, chemical, and mechanical stimuli

2. Your perception of the intensity of a sensory stimulus is influenced by
   a. the amplitude of receptor potentials generated at the peripheral endings of sensory axons
   b. the number of sensory axons activated by the stimulus
   c. the adaptation state of the affected receptors
   d. the amplitudes of action potentials in the axons that are responding
   e. the frequency of action potentials that the stimulus evokes in sensory axons

3. A patient with damage restricted to the right posterior parietal lobe
   a. may have impaired perception of the external world on his left
   b. may exhibit constructional apraxia
   c. loses pain and temperature sense on the left side of body AL-
   d. may deny that he has a deficit at all
   e. may exhibit astereognosis when this is tested in his right hand

4. Your ability to discriminate the smallest spatial features of tactile stimuli applied to your hand requires
   a. mechanoreceptors with encapsulated terminals
   b. cutaneous axons with relatively slow conduction velocities AL-
   c. cutaneous axon reflexes
   d. axons that pass through Lissauer's tract AL-
   e. skin with a relatively high innervation density (i.e. sensory axons per unit area of skin)

5. Hemisection of the spinal cord on the right side at segment L1 would result in
   a. a dissociated sensory loss
   b. loss of both touch and position sense in the left leg
   c. loss of pain and temperature sense in the left leg
   d. paralysis of the right leg
   e. Horner's syndrome on the right

6. Sensations of pain
   a. occur only when peripheral nociceptive fibers are active
   b. can be modified by activity in the dorsal column-medial lemniscal system
   c. in the face are associated with activity in the spinal tract of cranial nerve V
   d. do not involve the cerebral cortex
   e. can be exacerbated by release of endogenous compounds from nociceptive terminals
7. Outer hair cells of the organ of Corti
   a. are bathed partly in endolymph and partly in perilymph
   b. are outnumbered by inner hair cells
   c. contain a motor protein called prestin
   d. are essential components of the cochlear amplifier
   e. generate action potentials in response to loud sounds

8. A cochlear implant
   a. includes an electrode that is threaded into the scala tympani and used to stimulate the inner ear mechanically
   b. does not work unless the inner hair cells are intact
   c. is not useful for patients with severe conductive hearing loss
   d. takes advantage of the tonotopic arrangement of the cochlea to allow a patient to hear different frequencies of sound
   e. requires an intact spiral ganglion

9. Which of the following could contribute to a conductive hearing loss?
   a. fluid in the inner ear
   b. wax buildup in the auditory canal
   c. tear in the tympanic membrane
   d. paralysis of the stapedius muscle and the tensor tympani muscle
   e. damage to the stria vascularis

10. Complete section of the oculomotor (IIIrd) cranial nerve would result in:
    a. miosis
    b. ptosis
    c. anhydrosis
    d. mydriasis
    e. inability to adduct and elevate the affected eye

11. Impaired circulation in which of the following arteries would affect all or part of the primary somatic sensory cortex (S1)?
    a. the posterior cerebral artery
    b. branches of the middle cerebral artery
    c. the basilar artery
    d. the anterior cerebral artery
    e. the external carotid artery

12. The visual field defect illustrated here (scotoma is black)
    a. was caused by a lesion between the optic chiasm and the LGN
    b. is accompanied by loss of the direct and consensual pupillary light reflexes
    c. is probably due to pathology in the basilar artery
    d. may result from a pituitary tumor
    e. results from interruption of nasal retinal fibers from both eyes
13. Retinal detachment

a. separates the photoreceptors from the bipolar cells
b. deprives the photoreceptors of their choroidal blood supply
c. interferes with shedding of the photoreceptor outer segment discs
d. results in hyperpolarization and inactivation of the photoreceptors

e. occurs in a cleavage plane traceable to the embryonic ventricular system

14. Contributing to the high spatial acuity of foveal vision are

a. the high density of rod photoreceptors in the fovea
b. absence of retinal vessels in front of the central fovea
c. increased thickness of the retina in the foveal area due to the high concentration of ganglion cells
d. the fact that the fovea is less sensitive to light than the parafovea
e. the relative magnification of the foveal representation in the striate cortex.

II. True or False. Circle the T if the statement is True, the F if the statement is false (10 points)

T F When a myopic subject views a distant object, her ciliary muscles must contract harder than those of a hyperope (hypermetropes). Lens more curved.

T F In amblyopia ex anopsia, visual acuity is improved by viewing through a pinhole.

T F The afferent pupillary defect is manifest as a dilated pupil that is totally unresponsive to light.

T F With the eye exposed to air, the lens makes a greater contribution to the eye's refractive power than does the cornea.

T F Protopia is a special case of prosopagnosia.

F F Bell's palsy may be accompanied by absence of taste on the anterior two-thirds of the tongue.

T F Taste buds contain the cell bodies of primary gustatory afferent axons.

F F The olfactory system resembles the gustatory system in that receptor cells in both systems are replaced continuously throughout life.

T F Uncinate fits may be preceded by an intensely unpleasant taste.

F F Each olfactory receptor cell expresses only one type of receptor protein on its cilia, but responds to many different odorant molecules.