Multiple Choice and Matching (1 point each)

1) Which of the following joints has anterior and posterior cruciate ligaments?
   a) The shoulder
   b) The elbow
   c) The hip
   d) The knee
   e) None of the Above

2) The anterior cruciate ligaments normally prevents hyperextension of the knee.
   a) True
   b) False

3) The brachial plexus gives rise to all of the following nerves except:
   a) The axillary nerve
   b) The radial nerve
   c) The obturator nerve
   d) The median nerve
   e) The ulnar nerve

4) The intercostal nerves between the ribs arise from which spinal nerve plexus?
   a) Cervical
   b) Brachial
   c) Lumbar
   d) Sacral
   e) None of the Above

5) The dermatomes are non-overlapping regions of skin innervated by different spinal nerves.
   a) True
   b) False

6) The Golgi tendon reflex acts to inhibit muscle contraction in the muscle attached to the innervated tendon.
   a) True
   b) False
7) The primary auditory cortex is located in:
   a) The frontal lobe of the brain
   b) The temporal lobe of the brain
   c) The occipital lobe of the brain
   d) The hypothalamus
   e) The parietal lobe of the brain

8) Damage to the ____________________ nerve could result in defects of eye movement.
   a) Optic
   b) Vagus
   c) Trigeminal
   d) Facial
   e) Abducens

9) Part of the limbic system involved in forming new memories is the:
   a) Hippocampus
   b) Amygdala
   c) Hypothalamus
   d) Pituitary Gland
   e) None of the Above

10) Degeneration of the substantia nigra causes Alzheimer’s disease.
    a) True
    b) False

11) The optic nerve controls movements of the eye.
    a) True
    b) False

12) Muscarinic receptors bind
    a) Epinephrine
    b) Norepinephrine
    c) Acetylcholine
    d) Cholinesterase
    e) Neuropeptides

13) Which of the following does not result from sympathetic stimulation?
    a) Dilation of the pupil
    b) Acceleration of the heart
    c) An increase in digestive secretion
    d) Brochodilation
    e) Piloerection
14) The sympathetic nervous system stimulates digestion.
   a) True
   b) False

15) Filiform papillae of the tongue have no taste buds.
   a) True
   b) False

16) Vitreous humor fills the posterior segment of the eye.
   a) True
   b) False

17) Stimuli for hot and cold are detected by
   a) Free nerve endings
   b) Proprioceptors
   c) Meissners corpuscles
   d) Pacinian corpuscles
   e) Golgi tendon organs

18) The highest density of cone cells is found in:
   a) The crista ampullaris
   b) The optic disc
   c) The fovea centralis
   d) The macula lutea
   e) None of the above

19) Which incorrectly pairs a glial cell type with an associated function?
   a) Astocytes; formation of the blood-brain barrier
   b) Microglia; performance of immune function in the central nervous system
   c) Oligodendrocytes; formation of myelin sheath on axons in the peripheral nervous system
   d) Ependymal cells; regulation of production of cerebrospinal fluid
   e) Schwann cells; formation of myelin sheath on axons in the peripheral nervous system

20) Dendritic spines
   a) Are small processes on the ends of dendrites
   b) Change shape in response to learning
   c) Have been associated with nervous system disorders
   d) All of the above
21) The sense of taste that responds to metal ions is:
   a) Sweet
   b) Salt
   c) Sour
   d) Fat

22) An action potential
   a) Can be excitatory or inhibitory
   b) Cause graded potential on the post-synaptic neuron
   c) Have an absolute and relative refractory period
   d) A & B
   e) B & C

23) Other sensations that influence taste are:
   a) Smell
   b) Pain
   c) Temperature
   d) Texture
   e) All of the above

24) Olfactory Receptors
   a) Can be classified based on specific smell
   b) Cannot be classified based on smells
   c) Belong to less than a 100 different categories
   d) None of the above

25) Photoreceptors
   a) Are the only type of sensory receptor in the eye
   b) Sense and encode light patterns
   c) Respond only to bright light
   d) Respond only to dim light

26) Cones specifically respond to three colors of light, these colors are:
   a) Red, yellow and green
   b) Green, yellow and blue
   c) Blue, green and red
   d) None of the above

27) Myopia can occur:
   a) Because the eye is to short
   b) Because the eye is to long
   c) Because the cornea or lens is irregularly shaped
   d) Because the retina becomes detached
   e) None of the above
28) Direct neurotransmitters
   a) Promote long lasting effects
   b) Act through second messengers
   c) Directly open ion channels
   d) All of the above
   e) None of the above

29) This reflex is a medical condition that is caused by a congenital malfunction of the nerve signals in the trigeminal nucleus:
   a) Photic sneeze reflex
   b) Mammalian diving reflex
   c) Crossed extensor reflex
   d) Pandiculation (yawning)
   e) None of the above

30) Cerebrospinal Fluid (CSF) is:
   a) Circulating through the ventricles of the brain
   b) Aided by circulatory changes to produce movement
   c) A selective secretion
   d) All of the above
   e) None of the above

31) Nicotine easily crosses the blood-brain barrier.
   a) True
   b) False

32) The cranial nerve that functions in olfaction is:
   a) Cranial Nerve I
   b) Cranial Nerve VII
   c) Cranial Nerve X
   d) Cranial Nerve VIII

33) The biceps brachii is innervated by the:
   a) Phrenic nerve
   b) Musculocutaneous nerve
   c) Radial Nerve
   d) Femoral Nerve

34) The dorsal rami of the spinal nerves supply the anterior body trunk and limbs.
   a) True
   b) False
35) The nerves of the sympathetic nervous system exit in the brain and in the sacral region of the spinal cord.
   a) True
   b) False

36) The third and fourth ventricle are connected by the:
   a) Corpus callosum
   b) Reticular Formation
   c) Cerebral Aqueduct
   d) Pons
   e) None of the above

37) The diencephalon includes:
   a) A major synaptic relay system and integration center
   b) A structure that regulates blood pressure and body temperature
   c) The pineal gland
   d) All of the above
   e) None of the above

Match the lobe/hemisphere of the cerebrum with its function
38) Right Hemisphere
39) Left Hemisphere
40) Frontal Lobe
41) Temporal Lobe
42) Occipital Lobe
43) Parietal Lobe
   a) Controls motor movement and plans behavior
   b) Is the visual processing region of the brain
   c) Is associated with holistic reasoning and the transduction of musical stimuli
   d) Is the part of the brain that controls hearing
   e) Is associated with linear reasoning and mathematics
   f) Is responsible for transforming visual information to motor commands

44) The amount of sodium inside a resting neuron is ________________ than the amount of sodium outside the neuron.
   a) Greater
   b) Less
Match the term with its definition

45) Polarized  
(a) Ion movement that reduces the charge imbalance
(b) -70 mV in a resting neuron
(c) Movement of the cells charge back toward the resting potential
(d) Occurs because the cells interior is more negative than its exterior
(e) The development of a charge that is more negative than the cells resting membrane potential.
(f) The development of a charge reversal where the cells membrane potential becomes greater than zero.

46) Depolarization

47) Overshoot

48) Repolarization

49) Hyperpolarization

50) Resting Membrane Potential
Short Answer

1) Label the structures listed below on the eye using the corresponding letter (do not label them with the words you will get no credit). (5.5 points)
   a) Anterior Chamber
   b) Choroid
   c) Cornea
   d) Fovea Centralis
   e) Iris
   f) Lens
   g) Optic Nerve
   h) Retina
   i) Pupil
   j) Sclera
   k) Vitreous Humor
2) What are the structures (both anatomical and physiological) that protect the brain and how do they protect the brain. (6 points)

3) When you step on a tack, a simple reflex initiates a response that causes you to pull your foot off of the tack.
   a) What would happen if the interneuron in the reflex arc generating the response was ablated (eliminated)? (1 point)
   
   b) Would you sense the tack? (0.5 points)

   c) Would you still pull your foot off the tack? (0.5 points)

   d) Would the amount of time it took you to pull the foot of the tack increase, decrease or remain the same? Why? (2 points)
4) A toxin produced by an aquatic snail blocks voltage gated calcium channels. With your knowledge of the nervous system propose a mechanism (you may use drawings) of why this toxin can be used as an analgesic (pain killer) during surgery. (5 points)

5) Draw two graphs on the first graph demonstrate spatial summation and on the second graph demonstrate temporal summation. (6 points) Be sure to label the axis’s.
6) Fill in the following table with regards to the listed neurotransmitters. An example has been provided. (4.5 points)

<table>
<thead>
<tr>
<th>Neurotransmitter</th>
<th>Inhibitory or Excitatory</th>
<th>Mechanism of Action (Direct or Indirect)</th>
<th>Chemical Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dopamine</td>
<td>Excitatory &amp; Inhibitory</td>
<td>Indirect</td>
<td>Biogenic Amine</td>
</tr>
<tr>
<td>Acetylcholine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norepinephrine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glutamate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somatostatin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7) Fill in the table below comparing and contrasting the parasympathetic and the sympathetic nervous system. (3 points)

<table>
<thead>
<tr>
<th>Division</th>
<th>Origin of Fibers</th>
<th>Length of Fibers</th>
<th>Location of Ganglia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sympathetic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parasympathetic</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8) Receptors can be classified based on the type of stimuli they respond to. List the five classes of receptors based on stimulus type, list the stimulus they respond to and give a specific example of each. (10 points)
9) A patient has suffered severe neck trauma and now shows a variety of symptoms including hoarseness, irregular (in particular, unusually fast) heartbeat, problems with digestive secretion, and constipation.

   a) What division of the autonomic nervous system has been damaged, and how do you know from the symptoms? (2 points)

   b) Specifically, which nerve has sustained damage and how do you know? (2 points)

   c) Would localized trauma (to a small area) produce such a wide range of symptoms if the other division of the autonomic nervous system were damaged? Why? (2 points)