These review questions are for the Nervous system lecture topic. The questions were adapted from several sources, including 1700+ Review Questions for Anatomy and Physiology II (3rd edition) by R. Michael Anson, Ph.D.

You are required to know and understand all the material on the nervous system that is covered in the lecture and the laboratory. Questions marked with an asterisk are from material presented in the laboratory section of the course.

Multiple choice review questions:

1) The entire nervous system is divided into two main regions: The _____
   A) Brain and the spinal chord
   B) CNS and the PNS
   C) Neurons and the glial cells
   D) Motor neurons and the sensory neurons

2) The brain and the spinal cord are the _____ nervous system.
   A) Peripheral
   B) Autonomic
   C) Entire
   D) Central

3) All the nervous tissue outside the brain and spinal cord is the _____ nervous system.
   A) Peripheral
   B) Autonomic
   C) Somatic
   D) Central

4) Which of the following is **not** one of the basic functions of the nervous system?
   A) Formulate responses to sensory stimulation
   B) Send signals rapidly between body parts
   C) Produce major body fluids such as plasma and interstitial tissue fluid
   D) Detect sense stimuli

5) The cell type that carries out all the basic functions of the nervous system is the
   A) Neuroglia
   B) Neuron
   C) Adipocyte
   D) Schwann cell

6) The cells of nervous tissue that are **not** neurons but that assist neurons are called
   A) Amyloid plaques
   B) Fibroblasts
   C) Leukocytes
   D) Neuroglia

7) The numerous, small extensions from the neuron's cell body are known as the
A) axons.
B) nucleus.
C) axon collaterals.
D) dendrites.

8) A neuron generally has all of the following principle areas except
A) microvilli.
B) a cell body.
C) dendrites.
D) an axon.

9) The white fatty substance that coats axons to increase signal speed is
A) Myelin
B) Microfibrils
C) Dendrites
D) Adipocytes

10) One example of a function of neuroglial cells is to…
A) Add myelin to axons
B) Produce neurotransmitters
C) Bind neurotransmitters
D) Link one neuron cell to another at the synapse

11) A(n) ____ neuron transmits signals from the PNS to the central nervous system.
A) interneuron
B) sensory
C) motor
D) ganglion

12) A(n) ____ neuron transmits signals to muscles or glands from the CNS.
A) interneuron
B) sensory
C) motor
D) ganglion

13) The neurons completely inside the CNS are called
A) interneurons
B) sensory neurons
C) motor neurons
D) neuroglial cells

14) An involuntary response by the nervous system to a stimulus is a

A) Synapse
B) Reflex
C) Motor response
D) Smooth muscle

15) The correct term for the electrical signal that travels through the axon of a neuron is a(n)

A) Synapse
B) Endocytosis
C) Action potential
D) Ion

16) The axon has voltage gated ion channels. The term "voltage gated" means that…

A) ion channels open and close because of changes in the neuron's voltage
B) neuron voltage is controlled by neuroglial cells
C) iongates will not respond unless the neuron is in the CNS
D) voltage can only be controlled by a reflex

17) Both the depolarization and repolarization changes that occur during the action potential are produced by

A) Ions moving across the cell membrane
B) Small neuroglial cells that act as batteries for the neuron itself
C) Negative stimuli
D) Enzymes creating new ions

18) The two major ions involved in depolarization and repolarization of the neuron are

A) Na^+ and Ca^{2+}
B) Ca^{2+} and K^+
C) H_2O and $Fe^{2=}$
D) K^+ and Na^+

19) The movement of K^+ out of the cell makes the inside of the cell less positive (more negative) and acts to restore the original resting voltage of the neuron -a process called

A) depolarization.
B) hyperpolarization.
C) repolarization.
D) overshoot.

20) Arrange these action potential events in their proper sequence:

(1) The neuron is stimulated at the dendrites
(2) K^+ gates open
(3) The neuron is in a polarized "resting" state
(4) Na^+gates open
(5) The cell is fully depolarized
(6) The cell is fully repolarized

A) 1, 2, 4, 3, 5, 6
B) 3, 1, 4, 5, 2, 6
C) 4, 6, 2, 1, 5, 3
D) 1, 4, 2, 6, 5, 3

21) The small space that separates a neuron from its target cell is called the

A) Signal gap
B) Signal pathway
C) Dendrites
D) Synapse

22) Which of the following is not a function of neurons?

A) Detect sense stimuli.
B) Conduct electrical signals.
C) Release neurotransmitters.
D) All of these are neuron functions.

23) When the neurotransmitter molecules released from the axon terminals of a neuron have diffused across the synapse and have reached the dendrites of the target neuron, the neurotransmitters

A) Enter the target neuron by membrane transport proteins (ion channels)
B) Diffuse out of the synapse without causing any response in the target neuron
C) Bind to receptor proteins
D) Stimulate neuron growth

24) When a neurotransmitter binds to a receptor on the target cell, it causes the target cell to have a(n)…

A) Repolarization
B) Growth phase
C) Growth inhibition
D) Action potential

25) A bundle of axons in the PNS is called a

A) tract.
B) nerve.
C) nucleus.
D) ganglion.

26) A group of neuron cell bodies in the PNS is called a
A) tract.
B) nerve.
C) nucleus.
D) ganglion.

27) Any nerve that connects directly to the brain is called a
A) cranial nerve
B) nerve cephalique
C) mixed nerve
D) Brain process

28) A grouping of cell bodies located within the central nervous system is known as a
A) tract.
B) nerve.
C) nucleus.
D) ganglion.

29) The hollow fluid-filled spaces inside the brain are called
A) Ventricles
B) Gyri
C) Synapses
D) Cranial cavities

30) The brain is divided into ____ major regions
A) Two
B) Three
C) Four
D) Six

31) Which of the four major brain regions is the largest in humans?
A) Cerebellum
B) Brain stem
C) Cerebrum
D) Diencephalon

32) The right and left halves of the cerebrum (the cerebral hemispheres) are connected to each other mainly by a bundle of neuron axons called the
A) thalamus.
B) insula.
C) corpus cavernosum.
D) corpus callosum.

33) Which are **not** areas of the cerebrum?
A) Sensory signal receiving areas
B) Heart rate and breathing rate control areas
C) Logic and language areas
D) Motor signal generating areas

34) Sensations from the skin are converted to perceptions in which part of the cerebrum?
A) the primary motor area
B) the primary sensory area
C) Wernicke's area
D) Broca's area

35) Signals from the sense organs(such as the ears, eyes, nose, and mouth) are received and analyzed in what part of the brain?
A) the cerebellum
B) the cerebrum
C) the brainstem
D) the diencephalon

36) Damage to _____ causes a person to speak very slowly and with poor articulation.
A) Broca's area
B) Wernicke's area
C) the medulla oblongata
D) the corpus callosum

37) The area of the brain responsible for conscious thought, intellect, memory storage and processing, and language is the…
A) thalamus.
B) cerebellum.
C) medulla oblongata.
D) cerebrum.

38) Emotions, regulation of sleep, wakefulness, sexual arousal, thirst, hunger, body temperature, and production of certain hormones are all functions of what structure of the brain?
A) hypothalamus
B) thalamus
C) cerebrum
D) cerebellum

39) This brain area is a routing center for incoming sense signals
A) Cerebellum
B) Brain stem
C) Thalamus
D) Spinal cord

40) The hypothalamus does *not* contain a control center for the homeostatic regulation of
A) body temperature.
B) various emotional states.
C) urination
D) eating.

41) Which is **not** one of the three regions of the brain stem?
A) Midbrain
B) Pons
C) Medulla oblongata
D) Hypothalamus

42) The region of the CNS that contains the vital centers for regulating breathing rate, heart rate, and blood pressure is the
A) thalamus.
B) cerebrum.
C) medulla oblongata.
D) cerebellum.

43) Damage to the cerebellum causes
A) uncontrollable hunger
B) coma
C) loss of speech
D) loss of balance

44) The spinal cord contains tracts of interneurons. Some tracts carry _____ signals downward and other tracts carry _____ signals upward.
A) Cardiac, Motor
B) Sensory, Autonomic
C) Sensory, Motor
D) Motor, Sensory

45) The PNS contains these types of neurons (two answers)
A) Sensory
B) Interneurons
C) Motor neurons
D) Neuroglial neurons

46) Somatic motor neurons have axons that conduct signals from the CNS to ____; and are usually under ____ control.
A) Skeletal muscle; involuntary
B) Hollow organs; voluntary
C) Hollow organs; involuntary
D) Skeletal muscle; voluntary

47) Involuntary muscles and glands are innervated (stimulated by) neurons of the _____ nervous system

A) autonomic
B) somatic
C) sensory
D) central

48) Targets of the autonomic nervous system include all of the following except

A) cardiac muscle.
B) glands.
C) skeletal muscle.
D) smooth muscle in hollow organs.

49) The two major divisions of the ANS are

A) Peripheral and Central nervous systems
B) Voluntary and involuntary muscles
C) Sympathetic and parasympathetic
D) Neurons and neuroglia

50) Which ANS division is more active when we are relaxed and peaceful?

A) Parasympathetic
B) Voluntary
C) Peripheral
D) Central

51) The "fight or flight" response is the term used to describe activation of the ____.

A) parasympathetic division
B) sympathetic division
C) somatic nervous system
D) CNS

52) Motor signals in the ANS always pass through ____ (a number) motor neuron(s) before reaching a muscle. Motor signals in the SNS always pass through ____ (a number) motor neuron(s) before reaching a muscle.

A) 2, 2
B) 2, 1
C) 1, 3
D) 1, 2

53) The ganglia of the _____ division are closer to the spine than the ganglia of the _____ division.

A) Sympathetic, Parasympathetic
B) Parasympathetic, Peripheral
C) Sympathetic, Peripheral
D) Parasympathetic, Sympathetic

54) The effects of sympathetic and parasympathetic neurons on the heart can best be described as
A) antagonistic.
B) identical
C) cooperative.
D) adrenergic

55) In general, parasympathetic activation will produce effects that are _____ to those produced by activation of sympathetic neurons.
A) similar
B) antagonistic
C) complimentary
D) identical

56) Which of the following releases norepinephrine as a neurotransmitter?
A) preganglionic sympathetic neurons
B) postganglionic sympathetic neurons
C) preganglionic parasympathetic neurons
D) postganglionic parasympathetic neurons

57) All motor neurons release acetylcholine as a neurotransmitter except
A) postganglionic sympathetic neurons
B) somatic motor neurons
C) postganglionic parasympathetic neurons
D) specific cardiac and smooth muscle fibers.

58) When the parasympathetic system is stimulated, what neurotransmitter is released?
A) acetylcholine
B) norepinephrine
C) epinephrine
D) dopamine

59) Which of the following statements is true for preganglionic sympathetic neurons of the ANS?
A) They are longer than postganglionic sympathetic neurons.
B) They receive signals from interneurons
C) They release norepinephrine.
D) They synapse with muscles

60) The most common cause of mental retardation in newborns is
A) Hydrocephaly
B) Spinal trauma
C) Down syndrome
D) Fetal alcohol syndrome

61) A nervous system disorder of poorly controlled limbs. It is thought to be due to oxygen starvation to the infant's brain during a prolonged birth

A) Down syndrome
B) Quadriplegic
C) Cerebral palsy
D) Cerebrovascular accident

62) A person who has loss of sensation and movement of the lower limbs but not the upper limbs (usually due to a break in the lower portion of the spinal cord) is a

A) Spinal invalid
B) Quadriplegic
C) Paraplegic
D) Brachioplegic

63) Trauma to the head that causes some permanent brain damage is known as a

A) Concussion
B) Brain contusion
C) Cranial trauma
D) Cerebrovascular accident

64) Trauma to the head that causes no permanent brain damage is known as a

A) Concussion
B) Brain contusion
C) Cranial trauma
D) Cerebrovascular accident

65) Damage to a part of the brain due to lack of blood flow to that specific brain part is called a

A) Stroke
B) Brain atherosclerosis
C) Cranial hypoxia
D) Cerebral palsy

Answers to multiple choice questions:

1 = B
2 = D
3 = A
4 = C
5 = B
6 = D
7 = D
8 = A
9 = A
10 = A
11 = B
12 = C
13 = A
14 = B
15 = C
16 = A
17 = A
18 = D
19 = C
20 = B
21 = D
22 = D
23 = C
24 = D
25 = B
26 = D
27 = A
28 = C
29 = A
30 = C
31 = C
32 = D
33 = B

34 = B
35 = B
36 = A
37 = D
38 = A
39 = C
40 = C
41 = D
42 = C
43 = D
44 = D
45 = A and C
46 = D
47 = A
48 = C
49 = C
50 = A
51 = B
52 = B
53 = A
54 = A
55 = B
56 = B
57 = A
58 = A
59 = C
60 = C
61 = C
62 = C
63 = B
64 = A
65 = A

Fill-in-the-blank review questions:

1) The nervous tissue of the brain and spinal cord make up the _____ nervous system. All nervous tissue outside the brain and the spinal chord are part ofthe _____ nervous system.

2) The nervous system has three major functions: _____, _____, and _____.

3) The two principle cell types of nervous tissue are _____ (which detect stimuli and carry electrical signals) and supporting cells called _____ (which assist neurons but that do not detect stimuli or conduct signals).

4) The major organelles of the neuron (such as the nucleus) are located in the _____ region of the neuron.

5) _____ are the short, branching processes from the cell body which detect stimuli.

6) The _____ is the long process of a neuron that conducts the signal to the target cell.

7) The bulbs at the end of an axon where neurotransmitters are stored and released are called _____.

8) _____ is a white fatty coating wrapped around the axon which speeds the signals passing through the axon.

9) The myelin sheath, instead of being a smooth uniform coat along the axon, often has a lumpy appearance. The unmyelinated regions of the axon between the lumps of myelin are called _____.

10) The disease that is characterized by the progressive destruction of the myelin sheath is _____

11) As an example of a neuroglial cell's function, in lecture we discussed a neuroglial cell called a Schwann cell. Its function is to _____.

12) In terms of their functions, there are three types of neurons: _____, _____ and _____.

13) Name each neuron type described: The neuron type found only in the brain and spinal cord: _____. The neuron type that directly stimulates muscles to contract: _____. The neuron type that detects sensory stimuli: _____. The two types of neurons that are found in the PNS are _____ and _____. The type of neuron found entirely inside the CNS is _____.

14) Sensory neurons usually synapse with _____ neurons. Most motor neurons synapse with _____ cells. Interneurons can synapse with _____ neurons or _____ neurons.

15*) Sensory neurons have the shape shown below on the left. The name of this neuron shape is _____. Most motor nurons and interneurons have the shape shown below on the right. The name of this neuron shape is _____.

16) Sensory neurons are also called _____ neurons (a word that means “towards” because they conduct signals toward the CNS); whereas motor neurons are also called _____neurons (a word that means “away” because they conduct signals away from the CNS).

17) An involuntary response by the nervous system to a stimulus is called a _____.

18) Reflexes that control voluntary muscles are called _____ reflexes, whereas reflexes that control involuntary muscles are called _____ reflexes.

19) That pathway of neurons that a reflex signal travels through is called the _____.

20) All reflex arcs have _____ neurons and _____ neurons, but they may or may not have _____ neurons.

21) The electrical nerve signal that runs along the axon is also referred to as the _____.

22) In a resting neuron (a neuron not carrying a signal) the membrane potential (the electrical charge) is negative inside/outside (circle one) and positive inside/outside (circle one).

23) The major ions that change the membrane potential during an action potential are _____ and _____.

24) The positive electrical charge outside a resting neuron is caused by a large concentration of _____ ion outside the neuron.

25) The membrane proteins along the axon (which allow ions to pass through the membraneand which open and close in response to changes in the membrane potential) are called _____.

26) The passage of _____ ion into the cell makes the inside of the cell more positive—a process called _____.

27) When a neuron is resting, there is more Na^+/K^+ (circle one) inside than outside.When a neuron is resting, there is more Na^+/K^+ (circle one) outside than inside.

28) When a signal moves along the axon, _____ ions will cross the membrane **into** the neuron, and _____ ions will cross the membrane **out of** the neuron.

29) During the first part of an action potential, when the voltage is becoming more positive, the voltage gated sodium channels are open/closed (circle one) and the voltage gated potassium channels are open/closed (circle one).

30) During the second part of an action potential, when the voltage is becoming more negative, the voltage gated sodium channels are open/closed (circle one) and the voltage gated potassium channels are open/closed (circle one).

31) During an action potential, sodium ions enter/exit (circle one) the axon and potassium ions enter/exit (circle one) the axon.

32) In an action potential the last ion to move across the membrane is _____

33) When K^+ flows out of the neuron so that the inside of the cell becomes more negative, the neuron is said to be _____ (hint: a term that means returning to more negative inside).

34) A neuron is at rest (not carrying a signal). Then it is stimulated which causes a signal to rush down the axon to the neuron's target cell. In the blanks spaces after each description below, write 1–7 to indicate the correct order of events in the neuron.

K^+ begins to exit the neuron _____
The neuron becomes repolarized _____
The neuron releases neurotransmitter _____
Na^+ begins to enter the neuron _____
The neuron is negative inside and positive outside _____
The receptors in the dendrites are activated _____
The neuron becomes depolarized _____

35) After each description of a neuron, write a P if it describes a polarized neuron, write D if it describes a neuron that is depolarizing, and write R if it describes a neuron that is repolarizing.

Potassium is exiting the neuron _____
The neuron is more getting more positive outside _____
Sodium is entering the neuron _____
The neuron is at rest _____
An action potential is beginning in the neuron _____

36) The dendrites of a neuron contain _____, which allow the neuron to bind to and respond to neurotransmitters.

37) Each sentence below describes one step in a signal crossing a synapse. In the blank space after each sentence, write a number between 1 and 5 to show what order the events occur in.

A neuron releases neurotransmitters _____
The electrical signal reaches the end of an axon _____
The target neuron depolarizes _____
A neuron destroys neurotransmitters _____
Neurotransmitters cross the synapse _____

38) Two of the most abundant neurotransmitters are _____ and _____.

39) The gap between a neuron and the cell that will receive the neuron's signal is called a _____.

40) The cell that receives the signal at the synapse is called the _____ cell of the neuron that delivers the signal.

41) The neuron that delivers the signal to the synapse releases _____ molecules into the synapse.

42) At the distal end of each axon is an enlarged region called the _____, where the neurotransmitters are stored and released.

43) If a drug was added to a motor neuron so that it could not destroy the neurotransmitters that bound to its receptors, the muscle that the neuron stimulates would stay relaxed/contracted (circle one)

44) Endorphins are brain neurotransmitters that bind to the same receptors as _____ drugs

45) Clinical depression can be caused by too little _____ (a neurotransmitter) in brain synapses. Antidepressant drugs such as _____ relieve depression by boosting the amount of this neurotransmitter in the synapses.

46) The neuron cell bodies within the peripheral nervous system are often clustered into groups called _____

47) A _____ is a bundle of neuron axons (with blood vessels and connective tissues) in the PNS.

48) A _____ is a collection of neuron cell bodies located inside of the CNS.

49) Bundles of axons that provide connections between regions inside the central nervous system are called _____

50) Most (but not all nerves) have carry signals going to and from the CNS. These nerves with "two way traffic" are called _____ nerves.

51) Any nerve that connects to the CNS is the brain is called a _____ nerve, whereas any nerve that connects to the CNS is the spinal cord is called a _____ nerve.

52) _____ arehollow fluid-filled chambers within the brain. The fluid thatfills these hollow areas (and that also surrounds the entire CNS) is called the _____.

53*)Name ventricles A and B shown below. (Hint: Ventricles names are numbers).

54) The four major brain regions are the _____, _____, _____, and the _____.

55) Of the four major brain regions, the largest is the _____

56) _____ isthe tract (a bundle of white mylenated axons) which connects the left and right cerebral hemispheres.

57) Touch sensations are conveyed to the _____ of the cerebrum for interpretation.

58) True or false: Each small region of the primary sensory area has been mapped to touch signals from a particular body region.

59) True or false: The cerebrum has separate areas for receiving each type of sense signal.

60) The _____ area of the cerebrum is where voluntary movement signals are generated.

61) True or false: Each small region of the primary motor area has been mapped to control of a particular body region.

62) A patient able to speak but who chooses words at random and is unable to connect any meaningto words is likely to have damage to _____ area of the cerebrum.

63) A patient unable to speak despite having a clear concept of what is conceived (e.g. wanting coffee but unable to articulate of the word "coffee") has most likely incurred damage to _____ area in the cerebrum.

64) _____ area is where control of the muscles of speech to vocalize the words is located.

65) Of the four major brain regions, the region that controls math and logic is the _____.

66) Of the four major brain regions, the region that controls visual, spatial, and artistic skills is the _____.

67) The _____ is a part of the brain that contains such important structures as the thalamus and the hypothalamus

68) Sensory nerve signals converge in the _____, where they are sorted and relayed to the proper sensory areas of the cerebrum for interpretation.

69) The hypothalamus controls the _____ gland, which makes many hormones.

70) Body temperature regulation is controlled in the _____ region of the brain.

71) The _____ region of the brain contains the neural centers for hunger and thirst.

72) Of the four major brain regions, the _____ is the one that sits directly at the top of the spinal cord.

73) The brainstem is divided into three major regions: The _____, the _____, and the _____.

74) The superior-most of the three brainstemregions is called the _____.

75) The middle of the three brainstemregions is called the _____.

76) The inferior-most of the three brainstemregions is called the _____.

77) The medulla oblongata contains centers that control important body functions such as _____, _____, and _____.

78) The _____ is the brain region directly above the brain stem, and the _____ is the brain region posterior to the brain stem (hint: The answers are two of the four major brain regions).

79) The _____ brain region is involved in standing with balance, smoothness of movement, and memorized movements.

80) After each description below, write CR if it is located in the cerebrum of the brain, D if it is located in the diencephalon, BS if it is located in the brain stem, and CB if it is located in the cerebellum. Some blanks may require more than one answer.

a) The routing center for incoming sensory signals: _____
b) Language areas: _____
c) Balance: _____
d) Emotion: _____
e) Hunger: _____
f) Heart rate control: _____
g) Breathing control: _____
h) Generates voluntary movements: _____
i) Adds smoothness to voluntary movements: _____
j) Logic and math: _____
k) Receiving and interpreting centers for sense signals: _____

81) The spinal cord connects to the _____ region of the brain. Be as specific as possible.

82) The spinal cord has tracts of interneurons that carry _____ signals downward from the brain and that carry _____ signals upward toward the brain.

83) The major type of sense signal that travels upward through the spinal cord to the brain is the sense of _____. This is because the other types of sense signals are carried to the brain by cranial nerves, not through the spine.

84) Nerves that connect to the spinal cord are called _____ nerves.

85) Damage to the spinal cord in the cervical region will lead to paralysis of which limbs? _____. A person with this type of paralysis is called a _____.

86) Damage to the spinal chord in the lumbar region will lead to paralysis of which limbs? _____. A person with this type of paralysis is called a _____.

87) All the neurons in the PNS are either _____ neurons or _____ neurons.

88) There are two classes of motor neurons: _____ nervous system neurons, which control involuntary organs and _____ nervous system neurons, which control voluntary muscles.

89) In the somatic nervous system, the target organs are all _____ muscles (hint: a type of muscle tissue).

90) The autonomic nervous system is part of the PNS/CNS (circle one).

91) ANS motor neurons control two types of muscle: _____ muscle and _____ muscle. Both of these are voluntary/involuntary (circle one) muscle. The ANS motor neurons also control _____ (which are structures in the body that make and release substances).

92) The motor neurons that control the bicep muscle are part of the _____ nervous system. Be as specific as possible.

93) The motor neurons that control the muscles and glands in your small intestine are part of the _____ nervous system. Be as specific as possible.

94) The motor neurons that control heart rate are part of the _____ nervous system. Be as specific as possible.

95) The motor neurons that allow you to walk or throw a ball are part of the _____ nervous system. Be as specific as possible.

96) The motor neurons that control blood pressure and pupil size are part of the _____ nervous system. Be as specific as possible.

97) After each description below, write S if it applies to the somatic nervous system. Write A if it applies to the autonomic nervous system. Some blanks may require both answers.

a) Controls involuntary muscles: _____
b) Part of the PNS: _____
c) Made of motor neurons: _____
d) Controls voluntary muscles: _____
e) Controls the quadriceps muscles: _____
f) Controls the smooth muscles of the stomach: _____
g) Controls the speed of the heart beat: _____

98) In the somatic nervous system, each motor signal that travels from the CNS to the target organ passes through _____ (how many?) motor neurons.

99) In the autonomic nervous system, each motor signal that travels from the CNS to the target organ passes through _____ (how many?) motor neurons.

100) In the autonomic nervous system, each motor signal that emerges from the CNS moves sequentially through two motor neurons as it travels to the target organ. The first motor neuron is called the _____ neuron. The second motor neuron is called the _____ neuron.

101) The _____ division of the autonomic nervous system controls processes that are active when all is peaceful and going well.

102) The _____ division of the autonomic nervous system controls processes that are active when we are angry, frightened, or stressed.

103) Heart rate is increased by the _____ division of the ANS.

104) Heart rate is decreased by the _____ division of the ANS.

105) The bronchioles in the lungs are constricted by the _____ division of the ANS.

106) The bronchioles in the lungs are dilated by the _____ division of the ANS.

107) Digestive tract activity, including muscle contractions and secretion of digestive juices, is increased by the _____ division of the ANS.

108) Digestive tract activity, including muscle contractions and secretion of digestive juices, is decreased by the _____ division of the ANS.

109) The opposing effects of sympathetic and parasympathetic stimulation on most organs represent an example of _____ (opposite) effects.

110) In the ANS, the synapse between the preganglionic neuron and the postganglionic neuron is located inside a ganglion. In the sympathetic division of the ANS, this ganglion is located near/far (circle one) from the spinal cord and near/far (circle one) from the target organ.

111) In the ANS, the synapse between the preganglionic neuron and the postganglionic neuron is located inside a ganglion. In the parasympathetic division of the ANS, this ganglion is located near/far (circle one) from the spinal cord and near/far (circle one) from the target organ.

112) The _____ division of the ANS has long preganglionic neurons and short postganglionic neurons because the ganglia are located close to or within the target cells.

113) Although each individual motor neuron releases only one type of neurotransmitter, there are two types of motor neurons (in terms of which neurotransmitter they release). Some motor neurons release _____ neurotransmitter while other motor neurons release _____ neurotransmitter.

114) The only neurotransmitter released by neurons of the parasympathetic division of the autonomic nervous system (including the preganglionic neurons and the postganglionic neurons) is _____.

115) Two types of neurotransmitters are released by neurons of the sympathetic division of the autonomic nervous system. The preganglionic neurons release _____ neurotransmitter, while the postganglionic neurons release _____ neurotransmitter.

116) Theonly neurotransmitter released by neurons of the somatic nervous system is _____.

117) The most common cause of mental retardation is _____, which is caused by an extra chromosome.

118) The disease _____ is characterized as a neuromuscular disability. Victims of this disorder have poorly controlled voluntary movement. Although its causes are not always known, it is thought that brain damage during birth may play a role.

119) Impaired blood circulation to the brain due to a blocked or broken vessel is known as a _____ or _____.

120) Trauma to the head can alter a person's mental status (for example, make them confused or unconscious) by injuring the brain. If the brain injury is not permanent, it is called a _____. If the brain injury does cause some permanent damage, it is called a _____.

121) Alcohol and drugs _____ neurons.

122) In some elderly people, occasional forgetfulness and confusion occur due to the slow loss of neurons throughout life. These symptoms are called mild _____.

123) An abnormal build up of proteins surrounding neurons is the cause of neuron death in _____ disease. The major symptoms of this disease are severe senility and dementia.

Answers to fill-in-the-blank review questions:

1) Central
Peripheral
2) Detect sense stimuli
Formulate a response to the stimulus
Send signal rapidly between body parts
3) Neurons
Neuroglia
4) Cell body
5) Dendrites
6) Axon
7) Axon terminals
8) Myelin
9) Nodes of Ranvier
10) Multiple sclerosis
11) Add myelin to the axon
12) Sensory neurons
Interneurons
Motor neurons
13) Interneuron
Motor neuron
Sensory neuron
Sensory neurons
Motor neurons
Interneurons
14) Interneurons
Muscle cells
Motor neurons
Other interneurons
15) Unipolar neuron
Multipolar neuron
16) Afferent
Efferent
17) Reflex
18) Somatic reflexes
Autonomic reflexes
19) Reflex arc
20) Sensory neurons
Motor neurons
Interneurons
21) Action potential
22) Inside
Outside
23) Na^+
K^+
24) Na^+
25) Voltage gated ion channels
26) Na^+
Depolarization
27) K^+
Na^+
28) Na^+
K^+
29) Open
Closed
30) Closed
Open
31) Enter
Exit
32) K^+
33) Repolarizing

34) 5
6
7
3
1
2
4

35) R
D
D
P
D

36) Receptor proteins

37) 2
1
4
5
3

38) Norepinephrine
Acetylcholine

39) Synapse

40) Target cell

41) Neurotransmitter

42) Axon terminal

43) Contracted

44) Opiate

45) Serotonin
Prozac or Zoloft

46) Ganglia

47) Nerve

48) Nucleus

49) Tracts

50) Mixed nerves

51) Cranial
Spinal

52) Ventricles
Cerebrospinal fluid

53) Third ventricle
Fourth ventricle

54) Cerebrum
Diencephalon
Brain stem
Cerebellum

55) Cerebrum

56) Corpus callosum

57) Primary sensory area

58) True

59) True

60) Primary motor area

61) True

62) Wernike's area

63) Broca's area

64) Broca's area

65) Cerebrum

66) Cerebrum

67) Diencephalon

68) Thalamus

69) Pituitary

70) Hypothalamus

71) Hypothalamus

72) Brain stem

73) Midbrain
Pons
Medulla oblongata

74) Midbrain

75) Pons

76) Medulla oblongata

77) Breathing rate
Heart rate
Blood pressure

78) Diencephalon
Cerebellum

79) Cerebellum

80) a = D
b = CR
c = CB
d = D
e = D
f = BS
g = BS
h = CR
i = CB
j = CR
k = CR

81) Medulla oblongata

82) Motor signals
Sensory signals

83) Touch

84) Spinal

85) Upper and lower limbs
Quadriplegic

86) Lower limbs only
Paraplegic
87) Sensory neurons
Motor neurons
88) Autonomic
Somatic
89) Skeletal muscles
90) PNS
91) Smooth muscle
Cardiac muscle
Involuntary
Glands
92) Somatic
93) Autonomic
94) Autonomic
95) Somatic
96) Autonomic
97) a = A
b = A and S
c = A and S
d = S
e = S
f = A
g = A
98) One
99) Two
100) Preganglionic
Postganglionic
101) Parasympathetic
102) Sympathetic
103) Sympathetic
104) Parasympathetic
105) Parasympathetic
106) Sympathetic
107) Parasympathetic
108) Sympathetic
109) Antagonistic
110) Near
Far
111) Far
Near
112) Parasympathetic
113) Acetylcholine
Norepinephrine
114) Acetylcholine
115) Acetylcholine
Norepinephrine
116) Acetylcholine
117) Downs syndrome
118) Cerebral palsy
119) Stroke
Cerebrovascular accident
120) Concussion
Brain contusion
121) Kill
122) Senility
123) Alzheimers

Short answer review questions:

1) What are the 3 main functions of the nervous system?

2) What is the function of the myelin sheath that surrounds most axons?

3) The myelin sheath, instead of being a smooth uniform coat along the axon, often has a lumpy appearance. Explain what causes the myelin to be found in lumps.

4) List all the structures that are part of a nerve and briefly describe the function of each part.

5) Explain why is it important for neurons to have enzymes that destroy neurotransmitters.

6) Signaling from a neurotransmitter in the synapse is ended by removing the neurotransmitter from the synapse. This can occur in several ways. Describe two of them.

7) Draw a neuron and label the axon, cell body, and dendrites.Circle the region where there are receptors for neurotransmitters. Draw a triangle around the region where the neuron releases neurotransmitters.

8) List the functions of the hypothalamus.

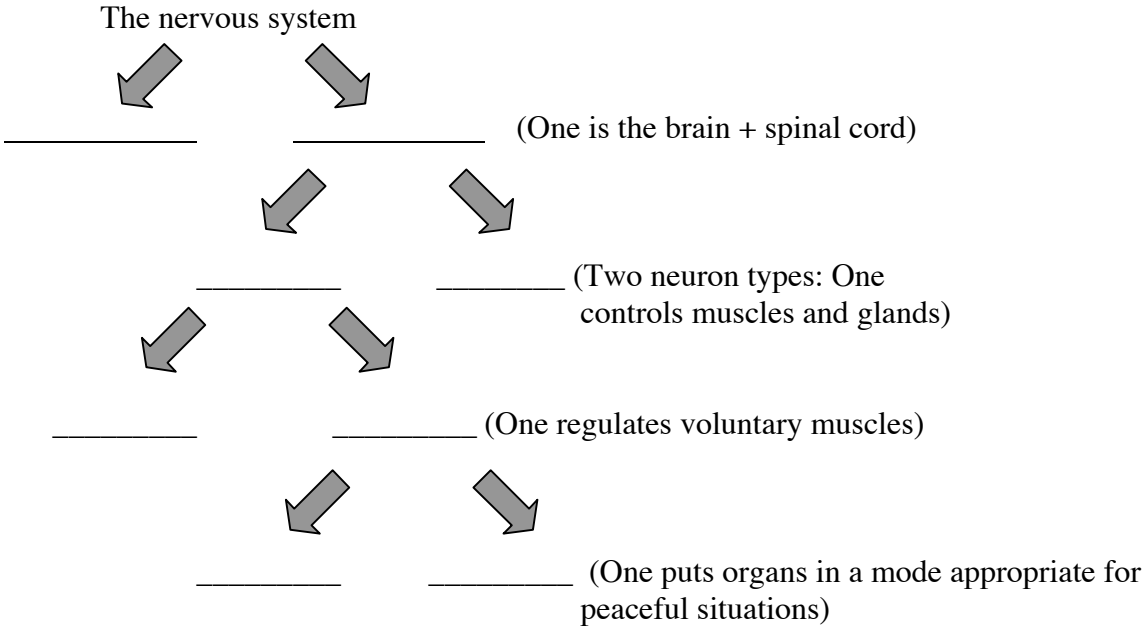
9) If the synapses in your thalamus somehow became randomly changed (in other words, your thalamus became "miswired") speculate how your perceptions of the world might change.

10) Explain the difference between a paraplegic and a quadriplegic, in terms of where the spine is damaged and what limbs are paralyzed.

11) Name the two divisions of the ANS in the blanks below. Under each one, briefly generalize about what situations it is used in. Also, choose an organ and state what effect(s) each division has on that organ.

_____ and _____

12) Fill in the blanks in the following chart of the nervous system sub-divisions. Hints are given at the left of each level.



13) Circle all the descriptions below that are true for neurons of the somatic nervous system:

Motor neurons Sensory neurons Interneurons

Controls digestive organs Controls skeletal muscle

Voluntary Involuntary Related to peaceful situations

Part of CNS Part of PNS Part of ANS Part of MTV

14) What is a stroke and what causes it?

15) A patient who has suffered brain damage (such as by a stroke or trauma to the head) and that is exhibiting difficulty initiating voluntary movement may well have damage to the _____ region of the cerebrum.

Answers to short answer review questions:

1) The three main functions are (1) Sensing sense stimuli, (2) Formulating a response to the stimuli, and (3) Rapid communication between body parts.

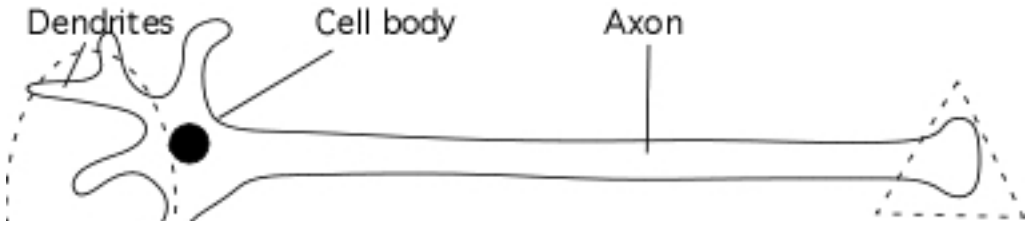
2) The myelin sheath increases the speed of signals traveling through the neuron. It also protects and insulates the neuron.

3) The myelin sheath has a lumpy appearance in many neurons because it is made by several small neuroglial cells called Schwann cells. Each Schwann cell attaches to its own spot on the axon. Each Schwann cell then turns itself into a lump of myelin. Each lump of myelin, therefore, comes from one Schwann cell.

4) Blood vessels (to sustain the neurons) and connective tissue (to bundle and protect the neurons).

5) Most neurons are stimulated to have an action potential by neurotransmitters. After the neurotransmitters have stimulated the neuron, the neuron must destroy them otherwise the neuron would constantly be having an action potential (in other words, it would become stuck, forever signaling its target cell).

6) The presynaptic neuron and the postsynaptic neuron both have enzymes that destroy the neurotransmitters. Also, the presynaptic neuron can reabsorb neurotransmitters for future use.

7) 

8) The hypothalamus regulates the pituitary gland. It also regulates thirst, hunger, temperature, the sleep/wakefulness cycle, emotions, sex drive, blood pressure and heart beat. Note that some of these functions are also controlled by other brain regions.

9) Incoming sensory signals would be sent to the incorrect sensory areas of the cerebrum. You might "taste" color, for example, or "feel" smells, or "see" sounds.

10) A paraplegic has full feeling and movement of the upper limbs but no feeling or movement of the lower limbs. This occurs when the spinal cord is severed below the spinal nerves that control the arms but above the spinal nerves that control the legs. A quadriplegic has no feeling or movement of any limbs. This occurs when the spinal cord is severed above the spinal nerves that control the arms and legs (such as in the cervical region).

11)

Sympathetic	Parasympathetic
Fearful or angry situations	Calm, peaceful, relaxed situations
Makes digestive organs less active	Makes digestive organs more active
Makes heart beat faster	Makes heart beat slower
Makes bronchioles in lungs dilate	Makes bronchioles in lungs constrict

12)

CNS PNS

Sensory Motor

SNS ANS

Sympathetic Parasympathetic

13) Circles on: Motor neurons, Controls skeletal muscle, Voluntary, Part of PNS

14) A stroke (also called a cerebrovascular accident) is when part of the brain is damaged due to loss of blood supply to that brain region. The blood supply may be lost due to bursting of a brain blood vessel (an aneurism) or due to clogging of a brain blood vessel by fats or a blood clot.

15) Primary motor area