MULTIPLE CHOICE

1) The part of the brain that secretes releasing hormones is the
   a) thalamus
   b) hypothalamus
   c) medulla
   d) pons

2) Which of the following statements is true concerning the sodium-potassium pump?
   a) 3 sodium ions are pumped out of the neuron for every 2 potassium ions pumped into the neuron
   b) 2 sodium ions are pumped out of the neuron for every 3 potassium ions pumped into the neuron
   c) 3 sodium ions are pumped out of the neuron for every 3 chloride ions pumped into the neuron
   d) 3 sodium ions are pumped out of the neuron for every 3 potassium ions pumped into the neuron

3) This brain area is a processing center involved with coordination of movements, balance and equilibrium, and posture?
   a) Thalamus
   b) Hypothalamus
   c) Cerebellum
   d) Cerebrum

4) Which statement(s) is/are true when considering the negative feedback mechanism of the Thyroid?
   a) TRH carried by hypophyseal portal veins to the posterior pituitary gland stimulates release of TSH by thyrotrophs
   b) low blood levels of T3 and T4 stimulate the release of TSH by the hypothalamus
   c) TSH released into blood stimulates thyroid follicular cells
   d) All of the above statements are true
   e) Only a and b are true
5) Which statement(s) is not true concerning diseases in which the axonal myelin sheath is progressively destroyed?
   a) Multiple Sclerosis is a disease caused by destruction of the myelin sheath in the CNS and PNS
   b) Guillain Barre disease is an x-linked inheritance disorder found primarily in females
   c) Adrenoleukodystrophy is a disease where there is a genetic deficiency in the formation or preservation of the myelin sheath
   d) All of these statements are not true
   e) Only a and b are not true

6) What are the two main ions that participate in electrical impulse transmission in neurons?
   a) Sodium and Calcium
   b) Potassium and Calcium
   c) Sodium and Potassium
   d) Calcium and Phosphorous
   e) Magnesium and Sodium

7) These transmit sensory information from muscles, tendons, and joints about the position of a body part, such as a limb in space?
   a) Exteroceptors
   b) Proprioceptors
   c) Interoceptors
   d) Nociceptors
   e) Teloreceptors

8) The cell body of a third order neuron is located in the
   a) Dorsal root ganglion
   b) Dorsal horn of the spinal cord
   c) Substantia gelatinosa
   d) Thalamus
   e) Somatosensory cortex

9) The embryonic hindbrain gives rise to what structure(s) in the brain?
   a) Cerebrum and basal ganglia
   b) Diencephalon
   c) Midbrain
   d) Cerebellum, Pons, and Medulla oblongata
   e) Pituitary gland
10) Which statement(s) is not true regarding reflexes?
   a) The knee-jerk reflex is an example of a monosynaptic reflex
   b) Reflexes involve at least three neurons and all arc through the spinal cord
   c) Reflexes are automatic, subconscious responses
   d) Many reflexes are carried out properly because of reciprocal innervation
   e) All of the above statements are not true

11) Which structures would not be innervated by the sympathetic nervous system?
   a) Skeletal muscle
   b) Cardiac muscle
   c) Smooth muscle
   d) Glands

12) Which of these sensory nerve endings sense deep cutaneous pressure, vibration and
    proprioception, and is found in the deep dermis or hypodermis?
    a) Merkel's disks
    b) Hair follicle receptors
    c) Pacinian corpuscles
    d) Ruffini's end organs
    e) Free nerve endings

13) This neurotransmitter is released from neurons innervating skeletal muscles at the
    neuromuscular junction to trigger muscle contraction?
    a) Acetylcholine
    b) Serotonin
    c) Dopamine
    d) Norepinephrine
    e) Glycine

14) Nerve cells located in the midbrain function as
    a) reflex centers
    b) producers of hormones
    c) hearing centers
    d) visual centers
    e) sensor for pain and heat
15) Which statement(s) are true regarding the structures of the eye?
   a) The cornea absorbs light; focus light onto retina
   b) The retina refracts light; detects light and forms image for transmission to brain
   c) The lens refracts light and is important in accommodation
   d) Only a and b are true
   e) All of these statements are true

16) The visual disorder myopia
   a) is more commonly known as nearsightedness
   b) occurs when rays focus behind the retina
   c) is due to natural elongation of the eyeball
   d) is corrected with a convex lens
   e) Only a and c are correct

17) All of the following are components of the retina except?
   a) bipolar neurons
   b) ganglionic neurons
   c) cone cells
   d) ciliary muscles

18) Which statement(s) is true regarding the blood-brain barrier?
   a) is formed by the contacts of astrocytes with blood vessels
   b) is essential for maintaining homeostasis in the brain
   c) lipid-soluble molecules pass through easily
   d) water soluble molecules require assistance of specific carrier molecules
   e) All of these statements are true

19) What is the function of the parathyroid glands?
   a) To regulate body temperature
   b) To regulate salt levels in the body
   c) To regulate calcium levels in the blood
   d) To metabolize carbohydrates and proteins
   e) To regulate blood sugar levels
20) Where is the mitochondria found in a nerve cell?
   a) cell body
   b) axon
   c) nucleus
   d) dendrite
   e) nodes of ranvier

21) The lobe of the brain important for the sense of touch
   a) occipital
   b) temporal
   c) parietal
   d) frontal
   e) pons

22) Which statement(s) is true regarding the hypothalamus?
   a) helps aid control of body temperature
   b) aids in regulation of food intake
   c) origin of four cranial nerves
   d) relay station for nearly all sensory impulses
   e) only a and b are true statements

23) Somatic efferent neurons
   a) are motor neurons that conduct impulses from the spinal cord to skeletal muscles
   b) are motor neurons that conduct impulses to smooth muscle, cardiac muscle, and glands
   c) are sensory neurons that conduct impulses initiated in receptors in smooth muscle and cardiac muscle
   d) are sensory neurons that conduct impulses initiated in receptors in the skin, skeletal muscles, tendons and joints
   e) both a and b are correct

24) Which of the following can result in the breakdown of the blood-brain barrier?
   a) Radiation
   b) Microwaves
   c) Hyperosmolality
   d) Hypertension
   e) All of the above
25) Which hormone is not secreted by the anterior lobe of the pituitary gland?
   a) Adrenocorticotrophin
   b) Thyrotrophin
   c) Antidiuretic hormone
   d) Melanocyte Stimulating Hormone

26) What part of the brain regulates the pituitary gland?
   a) Hypothalamus
   b) Pons
   c) Cerebellum
   d) Midbrain
   e) Cranial nerves

27) What part of the nerve cell accelerates the rate at which messages are transmitted?
   a) Dendrites
   b) Axon
   c) Myelin sheath
   d) Synapse
   e) Neurilemma

28) Which of the following is a function of the hormones produced by the thyroid gland?
   a) regulates metabolism
   b) regulates blood sugar levels
   c) produces vitamin D
   d) regulates salt levels

29) Which of the following is not a function of the sympathetic nervous system?
   a) slows heart rate
   b) releases noradrenaline preparing body for fight or flight
   c) increases inspiration
   d) increases blood supply to heart

30) All of the following are actions of glucocorticoids except
   a) inhibition of ACTH from anterior pituitary gland
   b) atrophy of skeletal muscle through loss of protein
   c) gluconeogenesis in liver to increase glycogen stores
   d) water elimination by stimulating glomular filtration
   e) suppression of immune system
31) Absence of reflexes is indicative of injury to
   a) lower motor neurons
   b) upper motor neurons
   c) lower sensory neurons
   d) upper sensory neurons
   e) both a and c are correct

32) Dendrites and cell bodies of sympathetic preganglionic neurons are located in the
   a) brain stem and sacral portion of the spinal cord
   b) sympathetic ganglia
   c) gray matter of the thoracic and upper lumbar segments of the spinal cord
   d) ganglia close to effectors

33) Hormones that influence the secondary sex characteristics may be produced by both the
   a) pancreas and pineal gland
   b) thyroid and parathyroid gland
   c) thymus and pituitary gland
   d) adrenal cortex and reproductive organs
   e) thyroid and pineal gland

34) Nerve impulses responsible for the sensation of taste are carried in all of the following cranial
    nerves except?
   a) VII
   b) VIII
   c) IX
   d) X

35) All of the axons of ganglionic neurons extend back to an area of the posterior eyeball called the
    a) fovea centralis
    b) macula lutea
    c) canal of Schlemm
    d) optic disk
36) Which statement(s) is true?
   a) the speed and persistence of response of the nervous system is much slower than that of the endocrine system
   b) the area of effect is targeted and specific for nervous system, while endocrine system is more general with widespread effects
   c) internal communication for nervous system is both electrical and chemical, while endocrine system is only chemical
   d) only b and c are correct
   e) all of the above statements are true

37) Which statement(s) is false regarding protein/peptide hormones?
   a) Most are lipid soluble
   b) Most hormones fall into this category
   c) An example of this type of hormone is insulin
   d) these hormones are large and cannot fit through membrane
   e) both a and b are false statements

38) The parasympathetic nervous system
   a) includes two long chains of ganglia, even and symmetrical to the spinal column
   b) essentially made up of vagus nerve which controls homeostasis and all functions of the internal organs
   c) plays role in regulating heart and respiratory rate
   d) both b and c are correct
   e) all of the above are correct

39) This cranial nerve innervates the muscles of mastication and transmits sensations coming from the face?
   a) facial
   b) trigeminal
   c) hypoglossal
   d) glossopharyngeal
   e) vagus
40) This layer of the cerebellum is made up of Purkinje cells which carry all the information relative to the movement of the body outside the cerebellum?
   a) molecular
   b) granular
   c) intermediate
   d) dorsal
   e) basilar

41) The hormone-membrane interaction of a target cell
   a) may modify the metabolism of the cell
   b) may influence protein synthesis of the target cell
   c) may cause structure change to the target cell
   d) only a and b are correct
   e) all of the above are correct

42) The major thyroid hormones
   a) are composed of 2 derivatives of the amino acid tyrosine bonded together
   b) contain iodine
   c) are relatively small and polar molecules
   d) cannot be taken as an oral medication
   e) both a and b are correct

43) An increased level of parathyroid hormone
   a) causes the bones to release calcium
   b) causes the kidneys to eliminate calcium through the urine
   c) blocks absorption of calcium through the intestinal wall
   d) only a and b are correct
   e) all of the above are correct

44) An 18 year old male patient who weighs 140 lbs comes to the doctors office with symptoms of weight loss, increased urination and extreme fatigue. His fasting blood glucose level was measure at 118. What would be the most probable diagnosis?
   a) Type II diabetes
   b) Type I diabetes
   c) Cushing's syndrome
   d) Diabetes insipidus
   e) Stress
45) From the information in the above question, what would be the primary first line treatment?
   a) Oral hypoglycemic agents
   b) Diet and exercise therapy with no medication
   c) Insulin therapy
   d) Antidepressants

46) From this patient based on the most probable diagnosis, which statement describes what we would see occurring in the body?
   a) total absence of delta cells
   b) total absence of alpha cells
   c) total absence of beta cells
   d) deficiency in the release of somatostatin

47) Which of the following is not a classification of an endocrine hormone?
   a) autocrine
   b) paracrine
   c) neural
   d) pheromonal
   e) All of these listed are classifications of endocrine hormones

48) The adrenal cortex synthesizes and secretes all of the following except
   a) epinephrine
   b) cortisol
   c) aldosterone
   d) androgens

49) The central sulcus divides the
   a) temporal lobe and parietal lobe
   b) cerebrum into two hemispheres
   c) frontal lobe and parietal lobe
   d) occipital lobe and parietal lobe
   e) frontal lobe and occipital lobe
50) Regulation of the body's biological clock and production of melatonin is performed by the
a) pons
b) thalamus
c) hypothalamus
d) cerebellum
e) pineal body

51) What is the neurotransmitter in a somatic motor pathway?
a) Ach
b) norepinephrine
c) glycine
d) ATP
e) dopamine

52) In the sympathetic division, preganglionic neurons are relatively________, and postganglionic
neurons are relatively__________?
a) long, short
b) short, long
c) narrow, wide
d) wide, narrow

53) The sense organ(s) responsible for the sense of balance is/are located in the
a) incus
b) vestibule
c) cochlea
d) semicircular canals
e) both b and d are correct

54) Otoliths are
a) responsible for tinnitus
b) responsible for the "righting reflex"
c) responsible for excess ear wax
d) ear stones
e) outer ear markings
55) From superficial to deep, the three layers of tissue that compose the eyeball are
   a) sclera, retina, choroid
   b) choroid, sclera, retina
   c) sclera, choroid, retina
   d) retina, choroid, sclera
   e) retina, sclera, choroid

56) The neurons of the retina in the order in which they conduct impulses?
   a) photoreceptor neurons, bipolar neurons, ganglion neurons
   b) photoreceptor neurons, ganglion neurons, bipolar neurons
   c) bipolar neurons, photoreceptor neurons, ganglion neurons
   d) bipolar neurons, ganglion neurons, photoreceptor neurons
   e) ganglion neurons, bipolar neurons, photoreceptor neurons

57) An intrinsic eye muscle is the
    a) pupil
    b) lens
    c) iris
    d) sclera
    e) retina

58) Hypersecretion of mineralocorticoids causes?
   a) Addison's disease
   b) Diabetes insipidus
   c) Kidney failure
   d) Cushing's Syndrome
   e) Pituitary tumor

59) Efferent nerves only transmit to which type of tissue?
   a) Nervous
   b) Elastic
   c) Connective
   d) Muscular and Glandular
   e) Skeletal
60) The Anterior Pituitary produces all of the following except
   a) TSH
   b) FSH
   c) PTH
   d) MSH
   e) GH

61) This area of the brain is associated with the production of speech?
   a) Wernicke's area
   b) Broca's area
   c) Cerebral cortex
   d) Pons
   e) Occipital lobe

62) Temperatures below ______ F stimulate pain receptors, producing a freezing sensation
   a) 32
   b) 40
   c) 70
   d) 50
   e) 35

63) Which statement(s) is true regarding glucagon?
   a) produced by alpha cells
   b) stimulates liver to convert glycogen to glucose, causing blood glucose levels to drop
   c) stimulates production of glucose from amino acids and lactic acid in the kidneys
   d) inhibits release of fatty acids from adipose tissue
   e) All of the above are true statements

64) This hormone is made by the body's adipose tissue and regulates food intake and energy expenditure?
   a) FSH
   b) Leptin
   c) ADH
   d) LH
   e) ANP
65) The limbic system is most involved in the control of
   a) sleep and wakefulness
   b) maintaining posture
   c) higher intellectual processes
   d) motor coordination
   e) emotions and basic drives

66) Hypothyroidism in adults produces a condition called?
   a) goiter
   b) cretinism
   c) acromegaly
   d) pituitary dwarfism
   e) myxedema

67) Which statement(s) is/are true regarding steroid hormones?
   a) produced by the adrenal cortex
   b) bind with the plasma membrane to enter target cell
   c) within the cytoplasm, can bind with a receptor protein and then enter the cell nucleus
   d) only a and c are true
   e) all of the above are true statements

68) Some examples of G-protein-coupled receptors include all of the following except
   a) odorant receptors
   b) taste receptors
   c) rhodopsin
   d) GABA(b) receptors at certain synapses in the brain
   e) receptors of steroid hormones

69) There are ____ primary taste sensations
   a) 4
   b) 5
   c) 6
   d) 3
   e) 2
70) The cochlea is filled with a special fluid called ________, which contains a high concentration of ________ ions
   a) exolymp, potassium
   b) endolymp, potassium
   c) endolymp, sodium
   d) cochlear, potassium
   e) cochlear, sodium

71) Which of the following can be classified as sensory receptors?
   a) mechanoreceptors
   b) thermoreceptors
   c) chemoreceptors
   d) photoreceptors
   e) All of the above can be classified as sensory receptors

72) Part of the cell body in which proteins are synthesized?
   a) Schwann cell
   b) axoplasm
   c) oligodendrocyte
   d) Nissl body
   e) microglia

73) The resting potential results from an excess of positively charged ions outside the plasma membrane as compared to the inside of the plasma membrane. Which statement(s) show the reason for this to occur?
   a) organic phosphate ions produce a negative charge inside the plasma membrane
   b) potassium ions are only present inside the plasma membrane
   c) sodium ions outside the membrane slightly outnumber the sodium ions found inside the membrane
   d) the proteins of the cytoplasm have a slightly positive charge
   e) All of the above are true and contribute to this effect
74) Given these areas of the cerebral cortex; 1.) Auditory association area, 2.) Broca's area, 3.) premotor area, 4.) primary auditory area, 5.) primary motor area, 6.) Wernicke's area, What is the correct sequence that these areas would be used as someone says "Hi" to you; you hear them and understand them and say "Hi" back to them?
   a) 4,1,2,6,3,5
   b) 1,4,2,6,3,5
   c) 4,1,6,2,5,3
   d) 4,1,6,2,3,5
   e) 1,4,6,2,3,5

75) Hypersecretion of prolactin can cause
   a) insufficient milk production in nursing women
   b) atrophy of breast tissue in non-nursing women
   c) impotence in men
   d) both a and b are correct
   e) inability to produce milk after pregnancy

76) What part of the brain is found at the back of the cranium?
   a) Cerebellum
   b) Cerebrum
   c) Hypothalamus
   d) Pons
   e) Broca's area

77) Which statement is true regarding the diencephalon?
   a) This is a region above the midbrain between hemispheres of the cerebrum
   b) It encloses the fourth ventricle
   c) organized into masses of gray matter called nuclei
   d) all of these statements are true
   e) only a and c are true

78) Interneurons make up most of the
   a) peripheral nervous system
   b) sensory nervous system
   c) central nervous system
   d) autonomic nervous system
   e) both a and b are correct
79) Destruction of the ventral nerve roots will result in
   a) the inability to move
   b) the inability to form cerebrospinal fluid
   c) the ability to speak louder than usual
   d) the ability to conduct more nerve impulses more efficiently
   e) none of these

80) An example of an amine hormone is
   a) ADH
   b) thyroxine
   c) oxytocin
   d) calcitonin
   e) insulin

TRUE or FALSE

81) Increased activity of the parasympathetic nervous system will cause heart rate to increase
   a) True
   b) False

82) A person who has the chicken pox as a child or who received the varicella vaccine will have
    immunity to shingles
   a) True
   b) False

83) Nyctalopia is also referred to as night blindness
   a) True
   b) False

84) cAMP and IP3 are the most common first messengers
   a) True
   b) False

85) Information from each eye must be processed in both halves of the brain
   a) True
   b) False
86) Nicotinic cholinergic receptors can be found on postganglionic sympathetic neurons as well as the motor end plate
   a) True
   b) False

87) The Hypoglossal nerve controls muscles used in head movement
   a) True
   b) False

88) Basal ganglia are masses of gray matter in each cerebral hemisphere important in control of voluntary muscle movements
   a) True
   b) False

89) When an impulse arrives at an end bulb, the end bulb membrane becomes more permeable to sodium
   a) True
   b) False

90) Pacinian corpuscles sense pressure and vibration changes deep in your skin
   a) True
   b) False

91) The posterior pituitary secretes three hormones
   a) True
   b) False

92) As we age, we secrete more thymosin
   a) True
   b) False

93) As thyroxine levels in the blood increase, the rate of cellular respiration also increases
   a) True
   b) False

94) Exocrine glands are ductless glands that secrete hormones into the bloodstream
   a) True
   b) False
95) The anterior pituitary is also called the adenohypophysis because the hormones it releases are actually released by neurons arising in the hypothalamus
   a) True
   b) False

96) FSH and LH are released in response to releasing hormone GnRH
   a) True
   b) False

97) Somatostatin stimulates both insulin and glucagon secretions
   a) True
   b) False

98) Excitability is the ability of a neuron to respond to the stimulus and convert it into a nerve impulse
   a) True
   b) False

99) Anatomy is the branch of science that studies the structure of the body.
   a) True
   b) False

MATCHING
100) ______ hypersecretion of thyroid hormones
101) ______ hypersecretion of human growth hormone
102) ______ hypersecretion of glucocorticoids
103) ______ hyposcretion of insulin
104) ______ hyposcretion on parathormone
105) ______ hyposcretion of thyroid hormones
106) ______ hypersecretion of antidiuretic hormone
107) ______ hyposcretion of human growth hormone
108) ______ hypersecretion of mineralocorticoids
109) ______ hypersecretion of insulin
110) ______ hypersecretion of parathormone
111) ______ hyposcretion of mineralocorticoids
112) ______ hypersecretion of oestrogen in men
113) ______ hypersecretion of testosterone in women
114) ______ hyposcretion of oestrogen in women
115) ______ hyposcretion of antidiuretic hormone

a) Hirsutism
b) Grave's disease
c) Cushing's syndrome
d) Hypoglycemia
e) Kidney failure
f) Polycystic ovarian syndrome
g) Cretinism
h) Oedema
i) Diabetes insipidus
j) Softened bones
k) Gigantism
l) tetany
m) Addison's disease
n) Gynacomastia
o) Dwarfism
p) Diabetes mellitus

SHORT ANSWER

116) Name of gland found in the Thorax?

117) What hormone is secreted by the pineal body?

118) What gland is known as the master gland?
119) What phase of menstruation is FSH produced?
For questions 120-129, give the source for the following hormones from the follow choices:

a) Thyroid  
b) Hypothalamus  
c) Anterior Pituitary  
d) Posterior Pituitary  
e) Adrenal Cortex

120) T3
121) ADH
122) GHRH
123) CRH
124) PRL
125) LH
126) FSH
127) DHEA
128) TRH
129) TSH
For the following actions, choose “a” if sympathetic control, or “b” if parasympathetic control:

130) constricts pupils
131) bronchial relaxation
132) increases sweat secretion
133) increases secretion of digestive juices/insulin
134) constricts blood vessels
135) slows heartbeat
136) relaxes bladder
137) increases epinephrine secretion
138) increases peristalsis
139) contracts ciliary muscle to accommodate near vision
Labeling—identify the structures of the ear by matching each term with its corresponding number on the following illustration.

---

- auditory tube
- stapes
- cochlea
- semicircular canals
- facial nerve
- external acoustic meatus
- vestibulocochlear (acoustic) nerve
- external ear
- middle ear
- inner ear
- auditory ossicles
- malleus
- round window
- auricle (pinna)
- vestibular nerve
- oval window
- incus
- vestibule
- temporal bone
- cochlear nerve
- tympanic membrane
Labeling—label the locations of the major endocrine glands on the following illustration.
MULTIPLE CHOICE

1) The part of the brain that secretes releasing hormones is the
   a) thalamus
   b) hypothalamus
   c) medulla
   d) pons

2) Which of the following statements is true concerning the sodium-potassium pump?
   a) 3 sodium ions are pumped out of the neuron for every 2 potassium ions pumped into the neuron
   b) 2 sodium ions are pumped out of the neuron for every 3 potassium ions pumped into the neuron
   c) 3 sodium ions are pumped out of the neuron for every 3 chloride ions pumped into the neuron
   d) 3 sodium ions are pumped out of the neuron for every 3 potassium ions pumped into the neuron

3) This brain area is a processing center involved with coordination of movements, balance and equilibrium, and posture?
   a) Thalamus
   b) Hypothalamus
   c) Cerebellum
   d) Cerebrum

4) Which statement(s) is/are true when considering the negative feedback mechanism of the Thyroid?
   a) TRH carried by hypophyseal portal veins to the posterior pituitary gland stimulates release of TSH by thyrotrophs
   b) low blood levels of T3 and T4 stimulate the release of TSH by the hypothalamus
   c) TSH released into blood stimulates thyroid follicular cells
   d) All of the above statements are true
   e) Only a and b are true
5) Which statement(s) is not true concerning diseases in which the axonal myelin sheath is progressively destroyed?
   a) Multiple Sclerosis is a disease caused by destruction of the myelin sheath in the CNS and PNS
   b) Guillain Barre disease is an x-linked inheritance disorder found primarily in females
   c) Adrenoleukodystrophy is a disease where there is a genetic deficiency in the formation or preservation of the myelin sheath
   d) All of these statements are not true
   e) Only a and b are not true

6) What are the two main ions that participate in electrical impulse transmission in neurons?
   a) Sodium and Calcium
   b) Potassium and Calcium
   c) Sodium and Potassium
   d) Calcium and Phosphorous
   e) Magnesium and Sodium

7) These transmit sensory information from muscles, tendons, and joints about the position of a body part, such as a limb in space?
   a) Exteroceptors
   b) Proprioceptors
   c) Interceptors
   d) Nociceptors
   e) Teloreceptors

8) The cell body of a third order neuron is located in the
   a) Dorsal root ganglion
   b) Dorsal horn of the spinal cord
   c) Substantia gelatinosa
   d) Thalamus
   e) Somatosensory cortex

9) The embryonic hindbrain gives rise to what structure(s) in the brain?
   a) Cerebrum and basal ganglia
   b) Diencephalon
   c) Midbrain
   d) Cerebellum, Pons, and Medulla oblongata
   e) Pituitary gland
10) Which statement(s) is not true regarding reflexes?
   a) The knee-jerk reflex is an example of a monosynaptic reflex
   b) Reflexes involve at least three neurons and all arc through the spinal cord
   c) Reflexes are automatic, subconscious responses
   d) Many reflexes are carried out properly because of reciprocal innervation
   e) All of the above statements are not true

11) Which structures would not be innervated by the sympathetic nervous system?
   a) Skeletal muscle
   b) Cardiac muscle
   c) Smooth muscle
   d) Glands

12) Which of these sensory nerve endings sense deep cutaneous pressure, vibration and proprioception, and is found in the deep dermis or hypodermis?
   a) Merkel's disks
   b) Hair follicle receptors
   c) Pacinian corpuscles
   d) Ruffini's end organs
   e) Free nerve endings

13) This neurotransmitter is released from neurons innervating skeletal muscles at the neuromuscular junction to trigger muscle contraction?
   a) Acetylcholine
   b) Serotonin
   c) Dopamine
   d) Norepinephrine
   e) Glycine

14) Nerve cells located in the midbrain function as
   a) reflex centers
   b) producers of hormones
   c) hearing centers
   d) visual centers
   e) sensor for pain and heat
15) Which statement(s) are true regarding the structures of the eye?
   a) The cornea absorbs light; focus light onto retina
   b) The retina refracts light; detects light and forms image for transmission to brain
   c) The lens refracts light and is important in accommodation
   d) Only a and b are true
   e) All of these statements are true

16) The visual disorder myopia
   a) is more commonly known as nearsightedness
   b) occurs when rays focus behind the retina
   c) is due to natural elongation of the eyeball
   d) is corrected with a convex lens
   e) Only a and c are correct

17) All of the following are components of the retina except?
   a) bipolar neurons
   b) ganglionic neurons
   c) cone cells
   d) ciliary muscles

18) Which statement(s) is true regarding the blood-brain barrier?
   a) is formed by the contacts of astrocytes with blood vessels
   b) is essential for maintaining homeostasis in the brain
   c) lipid-soluble molecules pass through easily
   d) water soluble molecules require assistance of specific carrier molecules
   e) All of these statements are true

19) What is the function of the parathyroid glands?
   a) To regulate body temperature
   b) To regulate salt levels in the body
   c) To regulate calcium levels in the blood
   d) To metabolize carbohydrates and proteins
   e) To regulate blood sugar levels
20) Where is the mitochondria found in a nerve cell?
   a) cell body
   b) axon
   c) nucleus
   d) dendrite
   e) nodes of ranvier

21) The lobe of the brain important for the sense of touch
   a) occipital
   b) temporal
   c) parietal
   d) frontal
   e) pons

22) Which statement(s) is true regarding the hypothalamus?
   a) helps aid control of body temperature
   b) aids in regulation of food intake
   c) origin of four cranial nerves
   d) relay station for nearly all sensory impulses
   e) only a and b are true statements

23) Somatic efferent neurons
   a) are motor neurons that conduct impulses from the spinal cord to skeletal muscles
   b) are motor neurons that conduct impulses to smooth muscle, cardiac muscle, and glands
   c) are sensory neurons that conduct impulses initiated in receptors in smooth muscle and cardiac muscle
   d) are sensory neurons that conduct impulses initiated in receptors in the skin, skeletal muscles, tendons and joints
   e) both a and b are correct

24) Which of the following can result in the breakdown of the blood-brain barrier?
   a) Radiation
   b) Microwaves
   c) Hyperosmolality
   d) Hypertension
   e) All of the above
25) Which hormone is not secreted by the anterior lobe of the pituitary gland?
   a) Adrenocorticotrophin
   b) Thyrotrophin
   c) **Antidiuretic hormone**
   d) Melanocyte Stimulating Hormone

26) What part of the brain regulates the pituitary gland?
   a) **Hypothalamus**
   b) Pons
   c) Cerebellum
   d) Midbrain
   e) Cranial nerves

27) What part of the nerve cell accelerates the rate at which messages are transmitted?
   a) Dendrites
   b) Axon
   c) **Myelin sheath**
   d) Synapse
   e) Neurilemma

28) Which of the following is a function of the hormones produced by the thyroid gland?
   a) **regulates metabolism**
   b) regulates blood sugar levels
   c) produces vitamin D
   d) regulates salt levels

29) Which of the following is not a function of the sympathetic nervous system?
   a) **slows heart rate**
   b) releases noradrenaline preparing body for fight or flight
   c) increases inspiration
   d) increases blood supply to heart

30) All of the following are actions of glucocorticoids except
   a) inhibition of ACTH from anterior pituitary gland
   b) atrophy of skeletal muscle through loss of protein
   c) gluconeogenesis in liver to increase glycogen stores
   d) **water elimination by stimulating glomular filtration**
   e) suppression of immune system
31) Absence of reflexes is indicative of injury to
   a) lower motor neurons
   b) upper motor neurons
   c) lower sensory neurons
   d) upper sensory neurons
   e) both a and c are correct

32) Dendrites and cell bodies of sympathetic preganglionic neurons are located in the
   a) brain stem and sacral portion of the spinal cord
   b) sympathetic ganglia
   c) gray matter of the thoracic and upper lumbar segments of the spinal cord
   d) ganglia close to effectors

33) Hormones that influence the secondary sex characteristics may be produced by both the
   a) pancreas and pineal gland
   b) thyroid and parathyroid gland
   c) thymus and pituitary gland
   d) adrenal cortex and reproductive organs
   e) thyroid and pineal gland

34) Nerve impulses responsible for the sensation of taste are carried in all of the following cranial nerves except?
   a) VII
   b) VIII
   c) IX
   d) X

35) All of the axons of ganglionic neurons extend back to an area of the posterior eyeball called the
   a) fovea centralis
   b) macula lutea
   c) canal of Schlemm
   d) optic disk
36) Which statement(s) is true?
   a) the speed and persistance of response of the nervous system is much slower that that of the endocrine system
   b) the area of effect is targeted and specific for nervous system, while endocrine system is more general with widespread effects
   c) internal communication for nervous system is both electrical and chemical, while endocrine system is only chemical
   d) only b and c are correct
   e) all of the above statements are true

37) Which statement(s) is false regarding protein/peptide hormones?
   a) Most are lipid soluble
   b) Most hormones fall into this category
   c) An example of this type of hormone is insulin
   d) these hormones are large and cannot fit through membrane
   e) both a and b are false statements

38) The parasympathetic nervous system
   a) includes two long chains of ganglia, even and symmetrical to the spinal column
   b) essentially made up of vagus nerve which controls homeostasis and all functions of the internal organs
   c) plays role in regulating heart and respiratory rate
   d) both b and c are correct
   e) all of the above are correct

39) This cranial nerve innervates the muscles of mastication and transmits sensations coming from the face?
   a) facial
   b) trigeminal
   c) hypoglossal
   d) glossopharyngeal
   e) vagus
40) This layer of the cerebellum is made up of Purkinje cells which carry all the information relative to the movement of the body outside the cerebellum?
   a) molecular
   b) granular
   c) intermediate
   d) dorsal
   e) basilar

41) The hormone-membrane interaction of a target cell
   a) may modify the metabolism of the cell
   b) may influence protein synthesis of the target cell
   c) may cause structure change to the target cell
   d) only a and b are correct
   e) **all of the above are correct**

42) The major thyroid hormones
   a) are composed of 2 derivatives of the amino acid tyrosine bonded together
   b) contain iodine
   c) are relatively small and polar molecules
   d) cannot be taken as an oral medication
   e) **both a and b are correct**

43) An increased level of parathyroid hormone
   a) **causes the bones to release calcium**
   b) causes the kidneys to eliminate calcium through the urine
   c) blocks absorption of calcium through the intestinal wall
   d) only a and b are correct
   e) **all of the above are correct**

44) An 18 year old male patient who weighs 140 lbs comes to the doctors office with symptoms of weight loss, increased urination and extreme fatigue. His fasting blood glucose level was measure at 118. What would be the most probable diagnosis?
   a) Type II diabetes
   b) **Type I diabetes**
   c) Cushing's syndrome
   d) Diabetes insipidus
   e) Stress
45) From the information in the above question, what would be the primary first line treatment?
   a) Oral hypoglycemic agents
   b) Diet and exercise therapy with no medication
   c) Insulin therapy
   d) Antidepressants

46) From this patient based on the most probable diagnosis, which statement describes what we would see occurring in the body?
   a) total absence of delta cells
   b) total absence of alpha cells
   c) total absence of beta cells
   d) deficiency in the release of somatostatin

47) Which of the following is not a classification of an endocrine hormone?
   a) autocrine
   b) paracrine
   c) neural
   d) pheromonal
   e) All of these listed are classifications of endocrine hormones

48) The adrenal cortex synthesizes and secretes all of the following except
   a) epinephrine
   b) cortisol
   c) aldosterone
   d) androgens

49) The central sulcus divides the
   a) temporal lobe and parietal lobe
   b) cerebrum into two hemispheres
   c) frontal lobe and parietal lobe
   d) occipital lobe and parietal lobe
   e) frontal lobe and occipital lobe
50) Regulation of the body's biological clock and production of melatonin is performed by the
   a) pons
   b) thalamus
   c) hypothalamus
   d) cerebellum
   e) pineal body

51) What is the neurotransmitter in a somatic motor pathway?
   a) Ach
   b) norepinephrine
   c) glycine
   d) ATP
   e) dopamine

52) In the sympathetic division, preganglionic neurons are relatively______, and postganglionic
    neurons are relatively________?
    a) long, short
    b) short, long
    c) narrow, wide
    d) wide, narrow

53) The sense organ(s) responsible for the sense of balance is/are located in the
    a) incus
    b) vestibule
    c) cochlea
    d) semicircular canals
    e) both b and d are correct

54) Otoliths are
    a) responsible for tinnitus
    b) responsible for the "righting reflex"
    c) responsible for excess ear wax
    d) ear stones
    e) outer ear markings
55) From superficial to deep, the three layers of tissue that compose the eyeball are
   a) sclera, retina, choroid
   b) choroid, sclera, retina
   c) sclera, choroid, retina
   d) retina, choroid, sclera
   e) retina, sclera, choroid

56) The neurons of the retina in the order in which they conduct impulses?
   a) photoreceptor neurons, bipolar neurons, ganglion neurons
   b) photoreceptor neurons, ganglion neurons, bipolar neurons
   c) bipolar neurons, photoreceptor neurons, ganglion neurons
   d) bipolar neurons, ganglion neurons, photoreceptor neurons
   e) ganglion neurons, bipolar neurons, photoreceptor neurons

57) An intrinsic eye muscle is the
   a) pupil
   b) lens
   c) iris
   d) sclera
   e) retina

58) Hypersecretion of mineralocorticoids causes?
   a) Addison's disease
   b) Diabetes insipidus
   c) Kidney failure
   d) Cushing's Syndrome
   e) Pituitary tumor

59) Efferent nerves only transmit to which type of tissue?
   a) Nervous
   b) Elastic
   c) Connective
   d) Muscular and Glandular
   e) Skeletal
60) The Anterior Pituitary produces all of the following except
   a) TSH
   b) FSH
   c) PTH
   d) MSH
   e) GH

61) This area of the brain is associated with the production of speech?
   a) Wernicke's area
   b) Broca's area
   c) Cerebral cortex
   d) Pons
   e) Occipital lobe

62) Temperatures below ______ F stimulate pain receptors, producing a freezing sensation
   a) 32
   b) 40
   c) 70
   d) 50
   e) 35

63) Which statement(s) is true regarding glucagon?
   a) produced by alpha cells
   b) stimulates liver to convert glycogen to glucose, causing blood glucose levels to drop
   c) stimulates production of glucose from amino acids and lactic acid in the kidneys
   d) inhibits release of fatty acids from adipose tissue
   e) All of the above are true statements

64) This hormone is made by the body's adipose tissue and regulates food intake and energy expenditure?
   a) FSH
   b) Leptin
   c) ADH
   d) LH
   e) ANP
65) The limbic system is most involved in the control of
   a) sleep and wakefulness
   b) maintaining posture
   c) higher intellectual processes
   d) motor coordination
   e) emotions and basic drives

66) Hypothyroidism in adults produces a condition called?
   a) goiter
   b) cretinism
   c) acromegaly
   d) pituitary dwarfism
   e) myxedema

67) Which statement(s) is/are true regarding steroid hormones?
   a) produced by the adrenal cortex
   b) bind with the plasma membrane to enter target cell
   c) within the cytoplasm, can bind with a receptor protein and then enter the cell nucleus
   d) only a and c are true
   e) all of the above are true statements

68) Some examples of G-protein-coupled receptors include all of the following except
   a) odorant receptors
   b) taste receptors
   c) rhodopsin
   d) Gaba(b) receptors at certain synapses in the brain
   e) receptors of steroid hormones

69) There are ____ primary taste sensations
   a) 4
   b) 5
   c) 6
   d) 3
   e) 2
70) The cochlea is filled with a special fluid called ________, which contains a high concentration of ________ ions
   a) exolymph, potassium
   b) endolymph, potassium
   c) endolymph, sodium
   d) cochlear, potassium
   e) cochlear, sodium

71) Which of the following can be classified as sensory receptors?
   a) mechanoreceptors
   b) thermoreceptors
   c) chemoreceptors
   d) photoreceptors
   e) All of the above can be classified as sensory receptors

72) Part of the cell body in which proteins are synthesized?
   a) Schwann cell
   b) axoplasm
   c) oligodendrocyte
   d) Nissl body
   e) microglia

73) The resting potential results from an excess of positively charged ions outside the plasma membrane as compared to the inside of the plasma membrane. Which statement (s) show the reason for this to occur?
   a) organic phosphate ions produce a negative charge inside the plasma membrane
   b) potassium ions are only present inside the plasma membrane
   c) sodium ions outside the membrane slightly outnumber the sodium ions found inside the membrane
   d) the proteins of the cytoplasm have a slightly positive charge
   e) All of the above are true and contribute to this effect
74) Given these areas of the cerebral cortex; 1.) Auditory association area, 2.) Broca's area, 3.) premotor area, 4.) primary auditory area, 5.) primary motor area, 6.) Wernicke's area, What is the correct sequence that these areas would be used as someone says "Hi" to you; you hear them and understand them and say "Hi" back to them?
   a) 4,1,2,6,3,5
   b) 1,4,2,6,3,5
   c) 4,1,6,2,5,3
   d) 4,1,6,2,3,5
   e) 1,4,6,2,3,5

75) Hypersecretion of prolactin can cause
   a) insufficient milk production in nursing women
   b) atrophy of breast tissue in non-nursing women
   c) impotence in men
   d) both a and b are correct
   e) inability to produce milk after pregnancy

76) What part of the brain is found at the back of the cranium?
   a) Cerebellum
   b) Cerebrum
   c) Hypothalamus
   d) Pons
   e) Broca's area

77) Which statement is true regarding the diencephalon?
   a) This is a region above the midbrain between hemispheres of the cerebrum
   b) It encloses the fourth ventricle
   c) organized into masses of gray matter called nuclei
   d) all of these statements are true
   e) only a and c are true

78) Interneurons make up most of the
   a) peripheral nervous system
   b) sensory nervous system
   c) central nervous system
   d) autonomic nervous system
   e) both a and b are correct
79) Destruction of the ventral nerve roots will result in
   a) the inability to move
   b) the inability to form cerebrospinal fluid
   c) the ability to speak louder than usual
   d) the ability to conduct more nerve impulses more efficiently
   e) none of these

80) An example of an amine hormone is
   a) ADH
   b) thyroxine
   c) oxytocin
   d) calcitonin
   e) insulin

TRUE or FALSE

81) Increased activity of the parasympathetic nervous system will cause heart rate to increase
   a) True
   b) False

82) A person who has the chicken pox as a child or who received the varicella vaccine will have
    immunity to shingles
   a) True
   b) False

83) Nyctalopia is also referred to as night blindness
   a) True
   b) False

84) cAMP and IP3 are the most common first messengers
   a) True
   b) False

85) Information from each eye must be processed in both halves of the brain
   a) True
   b) False
86) Nicotinic cholinergic receptors can be found on postganglionic sympathetic neurons as well as the motor end plate
   a) True
   b) False

87) The Hypoglossal nerve controls muscles used in head movement
   a) True
   b) False

88) Basal ganglia are masses of gray matter in each cerebral hemisphere important in control of voluntary muscle movements
   a) True
   b) False

89) When an impulse arrives at an end bulb, the end bulb membrane becomes more permeable to sodium
   a) True
   b) False

90) Pacinian corpuscles sense pressure and vibration changes deep in your skin
   a) True
   b) False

91) The posterior pituitary secretes three hormones
   a) True
   b) False

92) As we age, we secrete more thymosin
   a) True
   b) False

93) As thyroxine levels in the blood increase, the rate of cellular respiration also increases
   a) True
   b) False

94) Exocrine glands are ductless glands that secrete hormones into the bloodstream
   a) True
   b) False
95) The anterior pituitary is also called the adenohypophysis because the hormones it releases are actually released by neurons arising in the hypothalamus
   a) True
   b) False

96) FSH and LH are released in response to releasing hormone GnRH
   a) True
   b) False

97) Somatostatin stimulates both insulin and glucagon secretions
   a) True
   b) False

98) Excitability is the ability of a neuron to respond to the stimulus and convert it into a nerve impulse
   a) True
   b) False

99) Anatomy is the branch of science that studies the structure of the body.
   a) True
   b) False

MATCHING
<table>
<thead>
<tr>
<th>Question Number</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>101)</td>
<td>Hypersecretion of human growth hormone</td>
</tr>
<tr>
<td>102)</td>
<td>Hypersecretion of glucocorticoids</td>
</tr>
<tr>
<td>103)</td>
<td>Hyposcretion of insulin</td>
</tr>
<tr>
<td>104)</td>
<td>Hyposcretion on parathormone</td>
</tr>
<tr>
<td>105)</td>
<td>Hyposcretion of thyroid hormones</td>
</tr>
<tr>
<td>106)</td>
<td>Hypersecretion of antidiuretic hormone</td>
</tr>
<tr>
<td>107)</td>
<td>Hyposcretion of human growth hormone</td>
</tr>
<tr>
<td>108)</td>
<td>Hypersecretion of mineralocorticoids</td>
</tr>
<tr>
<td>109)</td>
<td>Hypersecretion of insulin</td>
</tr>
<tr>
<td>110)</td>
<td>Hypersecretion of parathormone</td>
</tr>
<tr>
<td>111)</td>
<td>Hyposcretion of mineralocorticoids</td>
</tr>
<tr>
<td>112)</td>
<td>Hypersecretion of oestrogen in men</td>
</tr>
<tr>
<td>113)</td>
<td>Hypersecretion of testosterone in women</td>
</tr>
<tr>
<td>114)</td>
<td>Hyposcretion of oestrogen in women</td>
</tr>
<tr>
<td>115)</td>
<td>Hyposcretion of antidiuretic hormone</td>
</tr>
</tbody>
</table>

**SHORT ANSWER**

116) Name of gland found in the Thorax?  
**Thymus**

117) What hormone is secreted by the pineal body?  
**Melatonin**

118) What gland is known as the master gland?  
**Pituitary**

119) What phase of menstruation is FSH produced?  
**Proliferative**
Labeling—identify the structures of the ear by matching each term with its corresponding number on the following illustration.

5 auditory tube  
3 stapes  
8 cochlea  
14 semicircular canals  
12 facial nerve  
19 external acoustic meatus  
11 vestibulocochlear (acoustic) nerve

21 external ear  
17 middle ear  
15 inner ear  
4 auditory ossicles  
1 malleus  
6 round window  
20 auricle (pinna)  
10 vestibular nerve

13 oval window  
2 incus  
7 vestibule  
18 temporal bone  
9 cochlear nerve  
16 tympanic membrane
Labeling—label the locations of the major endocrine glands on the following illustration.

1. Pineal
2. Parathyroids
3. Testes
4. Ovaries
5. Adrenals
6. Pancreas
7. Thymus
8. Thyroid
9. Pituitary
10. Hypothalamus
**Bonus**

**Tiebreakers**

*Matching—select the best answer from the choices given and insert the letter in the answer blank.*

a. trachoma  
b. retinopathy  
c. myopia  
d. glaucoma  
e. astigmatism  
f. conjunctivitis  
g. nyctalopia  
h. hyperopia  
i. scotoma  
j. cataracts

- c. nearsightedness  
- e. an irregularity in the cornea  
- f. "pink-eye"  
- a. chlamydial conjunctivitis  
- j. cloudy spots in the eye's lens  
- b. often caused by diabetes mellitus  
- h. farsightedness  
- g. "night blindness"  
- i. loss of only the center of the visual field  
- d. excessive intraocular pressure caused by abnormal accumulation of aqueous humor