1. Activation of beta3-adrenoceptors in fat cells will cause a rise in lipolysis.
   a. True
   b. False

2. The beta-adrenoceptor antagonist, pindolol (Visken), is effective in the treatment of premature labor.
   a. True
   b. False

3. Parkinson's Disease can be effectively treated with the muscarinic agent, bethanechol (Urecholine), to increase cholinergic activity.
   a. True
   b. False

4. The ganglia of the sympathetic nervous system are principally distributed diffusely in the walls of the tissues or organs they innervate.
   a. True
   b. False

5. Physostigmine (Eserine) can be used in the treatment of atropine poisoning, glaucoma and smooth muscle atony.
   a. True
   b. False

6. Dopamine-beta hydroxylase is located in the vesicles of the noradrenergic nerve terminal and directly converts dopamine to epinephrine.
   a. True
   b. False
7. Uptake of choline from the parasympathetic neuroeffector junction can be inhibited by tricyclic antidepressants like amitriptylline (Amitril) and by cocaine.
   a. True
   b. False

8. All of the following actions are associated with the activation of alpha-adrenergic receptors (alpha1 or alpha2): decrease in the release of norepinephrine, vasoconstriction in blood vessels and relaxation of bronchial smooth muscle.
   a. True
   b. False

9. Pralidoxime (2-PAM, Protopam) is an effective treatment of poisoning by organophosphates, but only before “aging” of acetylcholinesterase has occurred.
   a. True
   b. False

10. Indirect acting sympathomimetics such as amphetamine, are characterized by the development of tachyphylaxis.
   a. True
   b. False

11. Edrophonium (Tensilon) is a long lasting cholinesterase inhibitor because it forms an irreversible bond with the esteratic site on acetylcholinesterase.
   a. True
   b. False

For questions 12 through 15, refer to the list of drugs below and match the ONE MOST appropriate response to the questions. Use any drug only ONCE.

   a. atropine (Isopto-Atropine)
   b. propranolol (Inderal)
   c. neostigmine (Prostigmin)
   d. dopamine (Intropin)
   e. dobutamine (Dobutrex)

12. This drug can be used in the treatment of myasthenia gravis.
13. This drug can be used in the treatment of congestive heart failure.
14. This drug can be used in the treatment of glaucoma.
15. This drug can be used in the treatment of septic shock.
For questions 16 through 18, refer to the list of receptors below and match the ONE MOST appropriate response to the questions. Use any receptor only ONCE.

a. alpha1-adrenoceptor
b. alpha2-adrenoceptor
c. beta1-adrenoceptor
d. beta2-adrenoceptor
e. beta3-adrenoceptor

16. Blockade of this receptor is not recommended in individuals with compromised pulmonary function, such as asthmatic patients.

17. Activation of this receptor in the central nervous system is used in the treatment of hypertension.

18. Activation of this receptor will increase the activity of phospholipase C.

For questions 19 through 20, refer to the list of receptors below and match the ONE MOST appropriate response to the questions. Use any receptor only ONCE.

a. nicotinic receptor on chromaffin cells in the adrenal medulla
b. nicotinic receptor at the neuromuscular junction
c. nicotinic receptor at the autonomic ganglia
d. muscarinic receptors in the periphery
e. muscarinic receptors in the central nervous system

19. Blockade of this receptor will cause postural (orthostatic) hypotension.

20. Activation of this receptor will increase the release of epinephrine into the circulation.
For the following questions (‘21’ to ‘25’), pick the blood pressure (BP) and heart rate (HR) tracing that would BEST describe the cardiovascular response to the intravenous administration of the agents listed below. Each tracing may be used for MORE THAN one question. The heart rate is shown below the blood pressure tracing. A rising HR line indicates an increase in HR, a falling line a decrease in HR.

21. The response to an intravenous injection of isoproterenol (Isoprel).

22. The response to an intravenous injection of isoproterenol after propranolol (Inderal).

23. The response to an intravenous injection of norepinephrine.

24. The response to an intravenous injection of norepinephrine after atropine.

25. The response to an intravenous injection of acetylcholine.
For questions 26 through 28, refer to the diagram of the noradrenergic nerve terminal depicted above. Note that five sites (‘A’ to ‘E’) are indicated on the diagram of the neuroeffector junction. For each of the agents listed below select the ONE MOST appropriate site for the primary action of the agent. Use any site only ONCE.

26. alpha-methyl-p-tyrosine (Metyrosine)
27. imipramine (Janimine, tricyclic antidepressant)
28. reserpine (Sandril, Serpasil)
For questions 29 through 31, refer to the diagram of the cholinergic nerve terminal depicted above. Note that five sites (‘A’ to ‘E’) are indicated on the diagram of the neuroeffector junction. For each of the agents listed below select the ONE MOST appropriate site for the primary action of the agent. Use any site only ONCE.

29. bethanechol   (Urecholine)
30. botulinus toxin
31. parathion     (Etilon, Folidol)
32. The drug of choice for the emergency treatment of glaucoma is: (Note: if all of the drugs are false, then choose ‘e’).
   a. acetylcholine (Miochol)
   b. propranolol (Inderal)
   c. methoxamine (Vasoxyl)
   d. pilocarpine (Oscusert-Pilo)
   e. none of the above

33. The drug of first choice in the emergency treatment of anaphylactic shock is: (Note: if all of the drugs are false, then choose ‘e’):
   a. propranolol (Inderal)
   b. epinephrine
   c. ephedrine (Vatronol)
   d. atropine (Isopto-Atropine)
   e. none of the above

34. Acetylcholine is the neurotransmitter in all but one of the following synapses. Identify the one where it is not.
   a. preganglionic parasympathetic nerve terminal
   b. neurons innervating the adrenal medulla
   c. preganglionic sympathetic nerve terminal
   d. postganglionic sympathetic nerve in vascular smooth muscle
   e. postganglionic sympathetic nerve in sweat glands

35. The rate limiting enzyme in the synthesis of norepinephrine is: (Note: if all of the enzymes are false, then choose ‘e’):
   a. monoamine oxidase
   b. dopa decarboxylase
   c. catechol-o-methyl transferase
   d. dopamine beta-hydroxylase
   e. none of the above

36. Intravenous injection of norepinephrine (noradrenaline) usually lowers heart rate. Which action of norepinephrine is responsible for triggering the bradycardia?
   a. activation of cardiac presynaptic alpha2-receptors
   b. vasodilation via vascular beta-receptors
   c. vasoconstriction via vascular alpha-receptors
   d. direct activation of the vagus
   e. direct activation of cardiac muscarinic receptors
37. Clinical uses of propranolol (Inderal) include all of the following except: (Note: if all the statements are true, then choose 'e'):
   a. asthma
   b. hypertension
   c. angina
   d. cardiac arrhythmias
   e. all of the above are true

38. Which of the following statements about amphetamine and methamphetamine is false? (Note: if all the statements are true, then choose ‘e’):
   a. act indirectly to release norepinephrine
   b. are associated with the development of tachyphylaxis
   c. can penetrate the blood brain barrier and have central actions
   d. are not substrates for catechol-o-methyl transferase (COMT)
   e. all of the above are true

39. Which of the following statements about muscarinic receptors is false? (Note: if all of the statements are true, then choose ‘e’):
   a. is a G-protein coupled receptor
   b. can inhibit adenylate cyclase
   c. can activate phospholipase C
   d. is similar in structure to the nicotinic receptor
   e. all of the above are true

40. The nicotinic actions of acetylcholine at the autonomic ganglia can be blocked by:
   a. homatropine (Hycodan)
   b. mecamylamine (Inversine)
   c. pilocarpine (Oscusert-Pilo)
   d. neostigmine (Prostigmin)
   e. none of the above