1. An increase in the activity of the sympathetic nervous system will cause venomotor tone to _______ which will cause venous return to __________.
   a. Increase – increase
   b. Increase – decrease
   c. Decrease – decrease
   d. Decrease – increase

2. During the body's response to heart failure, there will be increased secretion of renin by the kidneys. This will cause blood volume to __________ which will in turn cause blood pressure to ____________.
   a. Increase – increase
   b. Increase – decrease
   c. Decrease – decrease
   d. Decrease – increase

3. Sinusoidal capillaries are the _______ common type of capillary and are often found in the__________.
   a. Least – spleen
   b. Most – liver
   c. Most – skin
   d. Least – skin

4. Which of the following is the thickest?
   a. Tunica interna of a large artery
   b. Tunica intima of a capillary
   c. Tunica media of a vein
   d. Tunica media of a muscular artery

5. Compared to arteries, veins have:
   a. More valves
   b. More smooth muscle
   c. More oxygenated blood
   d. A thinner tunica media
   e. 2 of the above are correct

6. A change in the size of the radius of a vessel caused its resistance to increase by a factor of 81. Thus, the radius must have _____________ by a factor of ________________.
   a. Decreased – 3
   b. Decreased – 9
   c. Increased – 3
   d. Increased – 9

7. The total cross-sectional area of capillaries is ________ the total cross-sectional area of veins and ___________ the total cross-sectional area of arteries.
   a. Greater than - greater than
   b. Greater than - the same as
   c. Greater than - less than
   d. Less than - greater than
8. During exercise, CO2 and lactic acid can accumulate in skeletal muscle tissue. This will cause the local arterioles to __________ which will cause blood flow to __________.
   a. Vasodilate – increase
   b. Vasodilate – decrease
   c. Vasoconstrict – increase
   d. Vasoconstrict – decrease

9. Which of the following is the LOWEST?
   a. Normal BP in a capillary
   b. Normal systolic arterial BP
   c. Normal BP in the superior vena cava
   d. Normal diastolic arterial BP

10. Blood will have the SLOWEST velocity in which of the following?
    a. Capillaries
    b. Venules
    c. Superior vena cava
    d. Descending aorta

11. A possible consequence of deep anesthesia is a reduction in the tonic activity of sympathetic vasomotor neurons. This would cause the average diameter of systemic arterioles to __________ which would cause blood pressure to __________.
    a. Increase – increase
    b. Increase – decrease
    c. Decrease – decrease
    d. Decrease – increase

12. Activation of the adrenal medulla caused by a drop in blood pressure will cause plasma levels of epinephrine to __________ and blood pressure to __________.
    a. Increase – increase
    b. Increase – decrease
    c. Decrease – decrease
    d. Decrease - increase

13. Which capillary type would you claim to be the most permeable to large proteins?
    a. Continuous
    b. Glomerular
    c. Portal
    d. Sinusoidal
    e. Fenestrated

14. Which of the following capillary types is located in the most tissues?
    a. Fenestrated
    b. Glomerular
    c. Sinusoidal
    d. Continuous
    e. Portal
15. The greatest amount of smooth muscle is found in the:
   a. Arterioles
   b. Elastic arteries
   c. **Mucosal arteries**
   d. Venules
   e. Heart

16. Which one of the following vessels would have the lowest blood pressure?
   a. brachiocephalic artery
   b. brachial vein
   c. **subclavian vein**
   d. radial vein
   e. inferior mesenteric artery

17. An increase in ____________ will cause an increase in mean arterial pressure.
   a. Heart rate
   b. Blood volume
   c. Peripheral resistance
   d. Blood viscosity
   e. All of the above

18. The primary baroreceptors are found in the:
   a. Carotid sinus
   b. Aortic arch
   c. Atrial septum
   d. A and b
   e. A, b, and c

19. An ACE inhibitor would be expected to cause a(n):
   a. Decrease in plasma [angiotensin II]
   b. Decrease in plasma [aldosterone]
   c. Decrease in mean arterial pressure
   d. **All of the above**
   e. 2 of the above

20. Which of the following would be MOST involved in the vascular spasm phase of hemostasis?
   a. Tunica Externa
   b. **Tunica Media**
   c. Tunica Adventitia
   d. Tunica Muscularis
   e. Tunica Lumina
21. Marfan’s syndrome is characterized by an inability to make the protein fibrillin, which is a key component of elastic fibers. Which of the following vessels would be impacted the most by Marfan’s syndrome?
   a. Arterioles
   b. Splenic artery
   c. Capillaries
   d. Common carotid arteries
   e. Azygos vein

22. During intense aerobic exercise, you would expect the precapillary sphincters in skeletal muscle capillary beds to be:
   a. Open so that blood flow to the skeletal muscle cells would increase
   b. Closed so that blood flow to the skeletal muscle cells would decrease
   c. Open so that blood flow to the skeletal muscle cells would decrease
   d. Closed so that blood flow to the skeletal muscle cells would increase
   e. Closed during ventricular diastole and open during ventricular systole

23. The vessels that are subjected to the most CONTROL by the nervous system are the:
   a. Fenestrated capillaries
   b. Sinusoidal capillaries
   c. Venules
   d. Muscular arteries
   e. Arterioles

24. Which of the following is TRUE?
   a. Continuous capillaries are more permeable than fenestrated capillaries
   b. Continuous capillaries are found in the bone marrow and in cartilage but not in the skin
   c. Macrophages are part of the lining of some liver and spleen sinusoidal capillaries
   d. The capillaries in the brain typically have large intercellular clefts and no tight junctions
   e. None of the above

25. Which of the following could be found in veins but NOT in arteries?
   a. Tunica media
   b. Valves
   c. Tunica adventitia
   d. Red blood cells containing hemoglobin
   e. More than one of the above
For the next 4 questions, consider the following graph of pressure (y-axis) and distance along the capillary (x-axis).

26. Which of the following is TRUE?
   a. The dashed line (horizontal) represents capillary hydrostatic pressure while the dotted line (diagonal) represents capillary osmotic pressure
   b. The dotted line (diagonal) represents capillary hydrostatic pressure while the dashed line (horizontal) represents capillary osmotic pressure

27. At point A,
   a. Capillary hydrostatic pressure is greater than capillary osmotic pressure and thus fluid is forced out of the capillary
   b. Capillary hydrostatic pressure is greater than capillary osmotic pressure and thus fluid is forced into the capillary
   c. Capillary osmotic pressure is greater than capillary hydrostatic pressure and thus fluid is forced out of the capillary
   d. Capillary osmotic pressure is greater than capillary hydrostatic pressure and thus fluid is forced into the capillary

28. Starvation (i.e., inadequate protein intake) would cause point B (where the 2 lines intersect) to:
   a. Shift to the left
   b. Shift to the right

29. A massive histamine release (as can occur during a severe allergic reaction) would:
   a. Cause the difference between the dashed and dotted line at point A to increase
   b. Cause the difference between the dashed and dotted line at point A to decrease
   c. Have no effect

30. Andrew has a mean arterial pressure of 100 mmHg and a pulse pressure of 30 mmHg. His systolic blood pressure must be:
   a. 90 mmHg
   b. 100 mmHg
   c. 110 mmHg
   d. 120 mmHg
   e. 130 mmHg
31. You would expect to find fenestrated capillaries in:
   a. Skeletal muscle
   b. Endocrine organs
   c. Cardiac muscle
   d. Skin
   e. Pancreas

32. Stimulation of aortic baroreceptors due to high BP will result in:
   a. Stimulation of the cardioacceleratory center
   b. Increased sympathetic stimulation of the heart
   c. Increased vagus nerve activity
   d. Stimulation of the vasomotor center
   e. None of the above

33. The only blood vessels whose walls permit exchange between the blood and the surrounding interstitial fluids are the:
   a. Arteries
   b. Venules
   c. Veins
   d. Arterioles
   e. Capillaries

34. The blood vessels that play the most important role in the regulation of blood flow to a tissue and blood pressure are the:
   a. Arteries
   b. Arterioles
   c. Capillaries
   d. Venules
   e. Veins

35. As blood travels from the aorta toward the capillaries:
   a. Pressure increases
   b. Resistance increases
   c. Flow increases
   d. Viscosity increases
   e. Blood vessel diameter increases

36. Each of the following statements concerning the movement of fluid between capillaries and interstitial space is true EXCEPT:
   a. Blood hydrostatic pressure forces fluid from the capillary to the interstitial space
   b. Blood osmotic pressure moves fluid from the interstitial space to the capillary
   c. Interstitial fluid osmotic pressure is less than blood osmotic pressure
   d. Interstitial fluid hydrostatic pressure is less than blood osmotic pressure
   e. Blood hydrostatic pressure and blood osmotic pressure are equal in magnitude but opposite in direction
37. Anxiety can result in:
   a. Increased stimulation of the cardioinhibitory center by higher brain centers
   b. Increased stimulation of the cardioacceleratory center by higher brain centers
   c. Decreased heart rate
   d. Decreased blood pressure
   e. Both C and D

38. If blood pressure doubled at the same time that peripheral resistance were cut in half, the blood flow through a vessel would be:
   a. Doubled
   b. Halved
   c. 4 times greater
   d. ¼ as much
   e. Unchanged

39. Which of the following would have the greatest effect on peripheral resistance?
   a. Doubling the length of a blood vessel
   b. Doubling the diameter of a blood vessel
   c. Doubling blood viscosity
   d. Reducing blood viscosity by 63%
   e. Doubling the white blood cell count

40. Each of the following factors would increase peripheral resistance EXCEPT:
   a. Increased sympathetic stimulation
   b. Elevated levels of plasma epinephrine
   c. Vasodilation
   d. Increased hematocrit

41. Edema (i.e., an excessive accumulation of interstitial fluid) would likely occur when:
   a. The concentration of protein in the blood increases
   b. The heart fails to pump efficiently
   c. Capillary hydrostatic pressure decreases dramatically
   d. Capillary hydrostatic pressure decreases slightly
   e. None of the above

42. Increased levels of carbon dioxide in the blood will result in DECREASED:
   a. Heart rate
   b. Cardiac output
   c. Blood flow to the lungs
   d. Parasympathetic stimulation to the heart
   e. None of the above

43. When a person rises quickly from a prone position,
   a. The carotid baroreceptors are unaffected
   b. Venous return is increased
   c. Vasoconstriction of peripheral blood vessels soon follows
   d. Heart rate decreases
   e. The cardioacceleratory center in the medulla becomes less active
44. Former US President Lyndon B. Johnson was diagnosed with a tumor that caused him to secrete excess amounts of the hormone ADH. Because of the elevated levels of ADH, he exhibited:
   a. Decreased blood volume
   b. Increased blood pressure
   c. Excessive anaphylaxis
   d. Polycythemia
   e. All of the above

45. Each of the following conditions would probably result in an elevation of angiotensin II in the blood of a normal adult, EXCEPT:
   a. Essential hypertension
   b. Vasoconstriction of the renal arteries
   c. Decreased cardiac output
   d. Increased activity of the sympathetic nervous system
   e. Decreased blood flow to the kidneys

46. Vasodilation is the widening of a vessel lumen due to smooth muscle contraction.
   a. The above statement is TRUE
   b. The above statement is FALSE

47. Aldosterone will:
   a. Promote an increase in blood pressure
   b. Promote a decrease in blood volume
   c. Result in a larger urine output
   d. Both B and C
   e. None of the above

48. Pain, fright, or trauma can result in vasodepressor syncope, a sudden loss of consciousness that is associated with decreased cardiac output and peripheral vasodilation. Which of the following could be a possible explanation for the peripheral vasodilation?
   a. Increased activity of the vasomotor center.
   b. Increased release of epinephrine by the adrenal medulla.
   c. Increased release of antidiuretic hormone.
   d. Decreased activity of sympathetic nerves leading to peripheral blood vessels.
   e. Increased activity of the cardioacceleratory center and decreased activity of the cardioinhibitory center.

49. An increase in renin release:
   a. Causes a decrease in plasma [angiotensin II].
   b. Causes an increase in urine output.
   c. Causes a decrease in plasma [aldosterone].
   d. Is usually due to an increase in arterial blood pressure.
   e. Causes an increase in peripheral vasoconstriction.
50. During cerebral ischemia, the neurons in the vasomotor center become strongly excited. You would expect this to cause:
   a. Systemic vasodilation and an increase in peripheral resistance
   b. Systemic vasodilation and a decrease in peripheral resistance
   c. **Systemic vasoconstriction and an increase in peripheral resistance**
   d. Systemic vasoconstriction and a decrease in peripheral resistance
   e. Systemic vasoconstriction but no change in peripheral resistance

51. Reggie was diagnosed with hypertension. His personal physician, Dr. Lewis, ordered an MRI on Reggie’s renal arteries. The MRI showed that Reggie’s left renal artery was quite stenosed. This could:
   a. **Be responsible for Reggie’s hypertension because the left kidney would secrete excess amounts of renin.**
   b. Be responsible for Reggie’s hypertension because the left kidney would secrete insufficient amounts of renin.
   c. Not be responsible for Reggie’s hypertension because the adrenal glands secrete epinephrine, while the kidneys do not.
   d. Not be responsible for Reggie’s hypertension because the renal artery is a muscular artery and not an arteriole.
   e. Not be responsible for Reggie’s hypertension because angiotensin II is an extremely potent vasodilator.

52. In a situation where blood pressure drops precipitously, you would expect:
   a. Capillary filtration to greatly outweigh capillary reabsorption.
   b. Capillary filtration to slightly outweigh capillary reabsorption.
   c. Capillary filtration to become exactly equal to capillary reabsorption.
   d. **Capillary reabsorption to outweigh capillary filtration.**
   e. None of the above.

For items 53 to 69, use the following answer choices:

- Increase
- Decrease
- Stay the same

53. An increase in norepinephrine release onto arteriolar smooth muscle would cause the radius of that arteriole’s lumen to:

54. Alpha-bungarotoxin is chemical found in snake venom that prevents skeletal muscle contraction. Because of this, alpha-bungarotoxin would cause venous return to:

55. Morphine can cause a decrease in the rate and depth of respiration. Because of this, morphine would cause venous return to:

56. Obesity causes the likelihood of varicose veins to:

57. As you go from the aorta to the capillaries, total cross-sectional area will:

58. As you go from the common iliac artery to capillaries in your quadriceps, the velocity of blood flow will:

59. If systolic BP increases by 14.5mmHg and diastolic BP increases by 14.5mmHg, then pulse pressure will:

60. An increase in erythropoietin secretion by the kidneys will cause peripheral resistance to:

61. If total peripheral resistance did not change and cardiac output decreased, blood pressure would:

62. As tissue [lactic acid] increases, the diameter of the arterioles serving that tissue will:

63. A decrease in plasma [epinephrine] would cause peripheral resistance to:

64. An increase in plasma [atrial natriuretic peptide] would cause blood volume to:
65. Hypersecretion of antidiuretic hormone would cause blood pressure to:
66. There is a constant level of renin release from the kidneys. An enzyme that prevented renin from functioning properly would cause blood pressure to:
67. In the case of left ventricular failure, you would expect the formation of interstitial fluid along the pulmonary circuit to:
68. An increase in plasma [protein] would cause the rate of interstitial fluid formation to:
69. As blood flows from the arterial to the venous end of a capillary, capillary hydrostatic pressure will: