1. A drug that inhibited the angiotensin converting enzyme would cause mean blood pressure to:

2. As blood flows from the efferent arteriole to the cortical radiate vein, its glucose content will:

3. A dramatic decline in plasma levels of albumin will cause the volume of filtrate produced to:

4. Which of the following is NOT TRUE?
   a. The perirenal fat capsule is deep to the renal fascia.
   b. The medial surface of the kidney is concave.
   c. Most glomeruli are found in the renal columns.
   d. The tip of the renal pyramid is the renal papilla.
   e. The renal artery enters the kidney at the renal hilus.

5. Which of the following is NOT TRUE?
   a. Ureters are retroperitoneal.
   b. Ureters are lined by transitional epithelium.
   c. The ureter receives urine from the renal pelvis.
   d. The right kidney is slightly higher than the left kidney.
   e. There are more minor calyces than major calyces.

6. Which of the following is NOT TRUE?
   a. The urinary bladder is lined by transitional epithelium.
   b. The muscularis of the urinary bladder is known as the detrusor muscle.
   c. During the micturition reflex, both urethral sphincters will relax.
   d. The loop of Henle plays a role in concentrating urine.
   e. The parietal layer of the glomerular capsule is composed of podocytes.

7. Which of the following is NOT TRUE?
   a. Reabsorption of sodium results in the reabsorption of water and anions.
   b. Glucose has maximum rate of reabsorption.
   c. Something that is reabsorbed is probably smaller than albumin.
   d. The low osmotic pressure of the blood in the peritubular capillaries facilitates the reabsorption of water.
   e. There are segmental arteries but no segmental veins in the kidney.

8. Which of the following is NOT a function of the kidneys?
   a. Secretion of a hormone that affects the hematocrit
   b. Secretion of a hormone that acts to decrease mean arterial pressure
   c. Metabolism of vitamin D
   d. Regulation of plasma [Na⁺]
   e. Gluconeogenesis

9. Which of the following accurately describes kidney gross anatomy?
   a. Right kidney is slightly higher than the left
   b. Inferior to the adrenal glands
   c. Contains 3 layers of supportive tissue: renal capsule, adipose capsule, and renal fascia
   d. All of the above
   e. 2 of the above
10. Which of the following associations is INCORRECT?
   a. Parietal glomerular capsule: Simple squamous epithelium
   b. PCT: Simple cuboidal epithelium with microvilli
   c. DCT: Simple columnar epithelium with cilia
   d. Visceral glomerular capsule: Podocytes
   e. None of the above

11. As the hydraulic pressure in the capsular space increases, GFR will:

12. As adrenal cortical aldosterone secretion decreases, the amount of Na⁺ reabsorbed by the epithelial cells lining the renal pelvis will:

13. As MAP increases, plasma [angiotensinogen] will:

14. As sympathetic stimulation of the kidneys increases, the renal reabsorption of sodium will:

15. In response to an increase in MAP, the diameter of the afferent arteriole will:

16. As aldosterone secretion decreases, plasma [K⁺] will:

17. As blood pH increases, renal tubular reabsorption of HCO₃⁻ will:

18. As the breakdown of ingested nucleic acids proceeds, plasma [uric acid] will:

19. As filtrate flows from the capsular space to the collecting duct, its [creatinine] will most likely:

20. As blood flows from the efferent arteriole to the end of the peritubular capillaries, you would expect its [glucose] to:

21. An absence of Na⁺ in the filtrate would cause the rate of tubular amino acid reabsorption to:

22. As the volume of urine within the bladder exceeds 200 mL, the smooth muscle tension generated by the internal urethral sphincter will:

23. As the concentration of mannitol (a large sugar that cannot be reabsorbed by kidney tubule cells) in the filtrate increases, urine output will:

24. Which of the following associations is INCORRECT?
   a. Proximal convoluted tubule – Simple cuboidal epithelium with microvilli
   b. Loop of Henle – Helps create the osmolarity gradient in the renal medulla
   c. Parietal layer of glomerular Capsule – Part of the filtration membrane
   d. Visceral layer of glomerular Capsule – Contains Podocytes
   e. Glomerulus – Receives blood from the afferent arteriole

25. Which of the following is TRUE of the urinary bladder?
   a. It lacks rugae
   b. It contains a layer of skeletal muscle known as the trigone
   c. It plays a large role in urine modification (such as secretion and reabsorption of solutes)
   d. It contains a mucosa lined by transitional epithelium
   e. More than one of the above
26. Which of the following is TRUE of the urethra?
   a. In the male, the prostatic urethra is the longest portion
   b. The external urethral sphincter contains skeletal muscle
   c. The entire urethra is composed of stratified squamous epithelium
   d. The male urethra is 1.5 times as long as the female urethra
   e. The female urethra plays a role in the reproductive system whereas the male urethra does not.

27. The region of the ___________ that senses filtrate osmolarity is the ________________.
   a. DCT: Macula densa
   b. PCT: Macula densa
   c. DCT: Juxtaglomerular region
   d. PCT: Loop of Henle
   e. Afferent arteriole: Interstitial cells of Cajal

28. An increase in plasma angiotensin II will cause:
   a. An increase in aldosterone release
   b. An increase in BP
   c. An increase in water reabsorption via an increase in ADH release
   d. An increase in peripheral resistance
   e. All of the above

29. Which of the following is TRUE?
   a. The left kidney sits slightly lower than the right
   b. The concave surface of the kidney is lateral
   c. Superior to the kidney is a gland that secretes aldosterone
   d. The kidneys are intraperitoneal
   e. The renal medulla is more superficial than the renal cortex

30. In response to an increase in blood pressure, the diameter of the afferent arteriole to will:

31. An inability to synthesize plasma proteins would cause GFR to:

32. ADH causes the osmolarity of urine to:

33. Aldosterone causes urinary sodium output to:

34. Angiotensin II causes systemic BP to:

35. As blood travels from the interlobular artery to the interlobular vein, its creatinine content will:

36. As filtrate travels from the capsular space to the loop of Henle, its glucose content will:

37. A drug that prevented PCT sodium reabsorption would cause the amino acid content of urine to:

38. As the micturition reflex begins, the level of muscle tension in the detrusor muscle will:

39. As blood traveled from the efferent arteriole to the arcuate vein, you would expect its glucose content to:

40. A substance that is filtered but not reabsorbed would act to cause urine volume to:

41. Damage to the filtration membrane would cause the protein content of urine to:

42. Constriction of the efferent arteriole would cause net filtration pressure to:
43. An increase in plasma renin would cause plasma angiotensinogen to:

44. Glomerulonephritis is an inflammation of the renal cortex. As the body responds, antigen-antibody complexes accumulate between the foot processes of podocytes. This will cause the rate of filtrate formation to:

45. Dilation of the efferent arteriole and constriction of the afferent arteriole would cause GFR to:

46. If systemic BP increases, myogenic autoregulation will kick in. In this situation, the diameter of the afferent arteriole will:

47. Increased sympathetic output to the kidneys will cause plasma [angiotensin II] to:

48. If the sodium concentration within the cells lining the proximal convoluted tubule rose dramatically, urine [glucose] would most likely:

49. A low sodium concentration of the filtrate in the distal convoluted tubule could indicate that:
   a. Blood pressure is normal
   b. Blood pressure is high
   c. Blood volume is high
   d. Blood volume is low
   e. Both B and C are correct

50. The renal corpuscle consists of the glomerulus and glomerular capsule.
   a. The above statement is TRUE
   b. The above statement is FALSE

51. In terms of content, filtrate is more similar to urine than to blood.
   a. The above statement is TRUE
   b. The above statement is FALSE

52. Which of the following would NOT be a consequence of renal failure?
   a. Decreased glucose production AND vitamin D metabolism
   b. Decreased ability to synthesize red blood cells
   c. Increased plasma [waste]
   d. Decreased ability to maintain plasma pH
   e. None of the above

53. Filtration differs from secretion in terms of selectivity. All plasma molecules will be filtered but only certain plasma molecules will be secreted.
   a. The above is TRUE
   b. The above is FALSE

54. Immediately prior to entering the loop of Henle a drop of urine would be found in a:
   a. Papillary duct
   b. Minor calyx
   c. Distal convoluted tubule
   d. Capsule space
   e. Proximal convoluted tubule

55. An increase in secretion of H+ would probably cause plasma pH to:

56. An increase in the activity of the micturition center of the dorsolateral pons would cause tension produced within the detrusor muscle to:
57. You would typically expect glucose to be filtered but NOT reabsorbed.
   a. The above statement is TRUE
   b. The above statement is FALSE

58. Which of the following is a characteristic of the cells that line the PCT?
   a. Microvilli
   b. Brush border
   c. Large mitochondria
   d. All of the above
   e. 2 of the above

59. __________ occurs in the glomerulus while __________ occurs in the peritubular capillaries.
   a. Filtration sekretion
   b. Secretion/reabsorption
   c. Reabsorption/secretion
   d. Filtration/reabsorption
   e. 2 of the above are correct

60. Consider the following data and calculate the rate of excretion of molecule X.
   Molecule X is filtered at a rate of 8ug per minute
   Molecule X is reabsorbed at a rate of 7ug per minute
   Molecule X is not secreted at all
   a. Molecule X is excreted at a rate of 8ug/minute
   b. Molecule X is excreted at a rate of 7ug/minute
   c. Molecule X is excreted at a rate of 7.5ug/minute
   d. Molecule X is excreted at a rate of 15ug/minute
   e. Molecule X is excreted at a rate of 1ug/minute

61. Filtrate in the proximal convoluted tubule:
   a. Just exited the loop of Henle
   b. Is about to enter the glomerulus
   c. Is about to enter the glomerular capsule
   d. Has yet to enter the distal convoluted tubule
   e. None of the above

62. Which of the following associations is INCORRECT?
   a. Parietal layer of glomerular capsule – simple squamous epithelium
   b. Visceral layer of glomerular capsule – Podocytes
   c. Proximal convoluted tubule – simple cuboidal epithelium with microvilli
   d. Urinary bladder lining – simple columnar epithelium with goblet cells
   e. None of the above

63. Which of the following is TRUE?
   a. Most nephrons are found in the renal medulla
   b. The efferent arteriole typically has a larger diameter than the afferent arteriole
   c. 50% of fluid filtered at the glomeruli will be reabsorbed. The other 50% will be excreted as urine.
   d. The presence of proteins in the urine could indicate damage to the filtration membranes.
   e. None of the above
64. Which of the following is MOST IMPORTANT for nutrient reabsorption?
   a. Na+ reabsorption
   b. K+ reabsorption
   c. ADH reabsorption
   d. Renin
   e. Epinephrine

65. Which of the following is TRUE?
   a. Urine pH is usually quite alkaline
   b. Urine specific gravity is usually between 31.6 and 31.9
   c. Precipitations of calcium or magnesium in the urinary tract are known as kidney stones.
   d. Most reabsorption and secretion occur in the DCT
   e. All of the above

66. The ureter:
   a. Is lined by simple squamous epithelium
   b. Contains muscle under voluntary control
   c. Connects directly to the urethra
   d. Is shorter in males than in females
   e. Receives fluid from the renal pelvis

67. Which of the following is TRUE?
   a. The internal urethral sphincter is made of skeletal muscle associated with the urogenital diaphragm
   b. The trigone is found in men only
   c. The male urethra passes directly through the prostate gland
   d. A full bladder can hold more than 6 liters of urine
   e. None of the above

68. You injected your patient with a chemical known as PZB and collected the following data. Based on this data, calculate the amount of PZB appearing in his urine per minute.
   Rate of PZB filtration \( \rightarrow \) 10mg/min
   Rate of PZB reabsorption \( \rightarrow \) 2mg/min
   Rate of PZB secretion \( \rightarrow \) 4mg/min

   a. 16mg/min
   b. 4mg/min
   c. 12mg/min
   d. 8mg/min
   e. 0mg/min

69. Diabetes insipidus is a disease where the affected individual can urinate up to 40 liters of dilute urine per day. Which of the following hormonal imbalances could be a cause of diabetes insipidus?
   a. Severe hypossecretion of inhibin
   b. Severe hypersecretion of aldosterone
   c. **Severe hypossecretion of antidiuretic hormone**
   d. Severe hypersecretion of inhibin
   e. Severe hypossecretion of FSH
70. Which of the following associations is CORRECT?
   a. Glomerulus → filtration
   b. PCT → reabsorption
   c. Collecting duct → renin release
   d. PCT → secretion
   e. Loop of Henle → urine concentration

71. Which of the following is TRUE concerning the reabsorption of sodium by PCT cells?
   a. It creates an osmotic gradient that causes obligatory water reabsorption
   b. It creates an electrical gradient that causes reabsorption of negative ions such as Cl⁻ and HCO₃⁻
   c. Sodium enters the tubule cell passively and then is actively pumped out the other side by the sodium-potassium pump
   d. All of the above are correct
   e. 2 of the above are correct

72. Blood found in the peritubular capillaries:
   a. Is about to enter the efferent arteriole.
   b. Has yet to be filtered.
   c. Cannot be considered blood since it will lack red blood cells.
   d. Cannot be considered blood since it will lack amino acids.
   e. None of the above

73. A chemical that inhibited the action of renin would:
   a. Cause a decrease in plasma [aldosterone] and an increase in plasma [angiotensin II].
   b. Cause a decrease in plasma [angiotensin II] and an increase in plasma [aldosterone].
   c. Would cause a massive increase in both systolic and diastolic blood pressure.
   d. Could ultimately cause a decrease in urine output.
   e. Have no effect on blood pressure.

74. The transport maximum for glucose reabsorption is X. If the filtrate level of glucose is Y and Y>X, the amount of glucose appearing in the urine can best be represented as:
   a. 0
   b. Y
   c. X+Y
   d. Y-X
   e. X-Y

75. Which of the following is NOT TRUE?
   a. Water reabsorbed from the collecting duct can end up in the vasa recta.
   b. ADH-influenced water reabsorption is known as facultative reabsorption.
   c. In glycosuria glucose acts as an osmotic diuretic.
   d. Urine normally contains more uric acid than glucose.
   e. Normal urine has a pH that is less than 3

76. Which of the following is TRUE?
   a. Ureters are lined by transitional epithelium.
   b. Renal calculus is another term for infection of the loop of henle.
   c. The urinary bladder is just anterior to the pubic symphysis.
   d. A full bladder can hold up to 7000 milliliters of urine.
   e. None of the above

77. Filtrate that just entered the loop of Henle:
   a. Has not reached the DCT
b. Has already passed through the collecting duct
c. Will begin to release ADH
d. Will stop releasing ADH
e. Can now be considered plasma

78. If urine output is greater than fluid intake, blood volume will _______ and blood pressure will ________.
   a. Decrease – decrease
   b. Decrease – increase
   c. Increase – increase
   d. Increase – decrease