1. **The linear rate rise on the automatic power injector controls:**
   a. The rate at which the contrast is delivered
   b. The volume of contrast delivered
   c. The timing of the contrast bolus
   d. The time it takes for the injector to reach its maximum delivery rate

2. **Flow rate on an automatic power injector determines:**
   a. The speed at which the contrast will be delivered
   b. The volume of contrast that is delivered
   c. The force with which the contrast is delivered
   d. The duration of the injection

3. **Which of the following catheters could be used for a flush aortagram?**
   a. Pigtail
   b. Cobra
   c. RIM
   d. Simmons

4. **Indications for covered stents include:**
   a. Dissections
   b. Aneurysms
   c. Atherosclerosis
   d. Compressible areas
5. **Ports are accessed with what type of needle:**
   a. Single wall
   b. Trocar
   c. Non-coring
   d. Chiba

6. **Which of the following describes the Seldinger technique?**
   a. Needle in, .018 wire in, sheath in, catheter in.
   b. Needle in, .018 wire in, catheter in.
   c. Needle in, .018 wire in, transition dilator in, .035 wire in.
   d. Needle in, .035 wire in, sheath in.

7. **The inner most portion of a wire is the:**
   a. Wire Jacket
   b. Mandril
   c. Coating
   d. Filament

8. **Vascular sheaths are utilized to:**
   a. Protects the arteriotomy site
   b. Safely allow for multiple catheter exchanges
   c. Allow for the infusion of heparinized saline, thereby preventing the formation of thrombus
   d. All of the above

9. **Percutaneous transluminal angioplasty is used to:**
   a. Mechanically open or repair a blood vessel
   b. Stent a blood vessel
   c. Mechanically remove thrombus from a blocked artery
d. Administer medication

10. **Catheters that are braided will have improved:**
   a. Flexibility
   b. Radiolucency
   c. Pushability
   d. Flow rates

11. **An example of a permanent embolic agent is:**
   a. Gelfoam
   b. Autologus material
   c. Petressin
   d. Coils

12. **Self-expanding stents are indicated for use in:**
   a. Compressible areas
   b. Origins of vessel
   c. Aneurysms
   d. Ruptures

13. **The primary stent used for TIPS placement is the:**
   a. VIABIL
   b. VIATORR
   c. VIABAHN
   d. Open-celled, balloon expandable stent

14. **Inferior vena cava filters are designed to:**
   a. Prevent deep vein thrombosis
   b. Dissolve existing clot
c. Prevent life threatening pulmonary embolism

d. Treat May-Thurner

15. **Embolic protection devices are used to:**
   a. Deliver medication
   b. Catch distal emboli during intervention
   c. Perform mechanical embolectomy
   d. Dissolve thrombus

16. **Atraumatic CHIBA needles have a:**
   a. Beveled cannula with plastic cover
   b. Beveled cannula and stylet
   c. Beveled cannula and diamond tip stylet
   d. Blunt cannula and diamond tip stylet

17. **Wire guides can affect the __________ of a wire:**
   a. Torque
   b. Pushability
   c. Flexibility
   d. Stiffness

18. **Guidewires are measured in:**
   a. French
   b. Millimeters
   c. Fractions of a centimeter
   d. Fraction of an inch

19. **Biliary tubes are characterized by having sideholes:**
   a. On the distal pigtail
b. On distal pigtail and up the shaft of the catheter

c. Only on the shaft of the catheter

d. Biliary tubes are end hole catheters

20. **Percutaneous nephrostomy tubes have sideholes:**

a. On the distal pigtail

b. On distal pigtail and up the shaft of the catheter

c. Only on the shaft of the catheter

d. Biliary tubes are end hole catheters

21. **A measurement of the arterial pressure during systemic circulation is:**

a. Heart rate

b. Blood pressure

c. Cardiac cycle

d. Pulse

22. **A catheter that is inserted into the bladder to drain urine is an example of a:**

a. Foley Catheter

b. Drainage catheter

c. Multipurpose catheter

d. Nephrostomy catheter

23. **In the presence of renal insufficiency, which of the following can be used as an intravascular contrast agent?**

a. Barium

b. Iodinated contrast

c. CO2

d. Non-ionic contrast
24. Factors that can affect a patient’s response to medications include:
   a. Age
   b. Renal function
   c. Presence of fever or infection
   d. All of the above

25. Your patient tells you she often gets nauseated while receiving sedation. An ideal choice of a prophylactic anti-emetic for the patient would be:
   a. Zofran (Ondansetron)
   b. Dilaudid (Hydromorphone)
   c. Fentanyl (Sublimaze)
   d. Decadron (Dexamethasone)

26. What do you give a patient to decrease their INR?
   a. FFP
   b. Whole blood
   c. Heparin
   d. Potassium

27. A drug that inhibits the bloods ability to clot or coagulate is defined as a:
   a. Anticoagulant
   b. Antiemetic
   c. Sedative
   d. Antiplatelet

28. The standard compression rate for adult CPR is:
   a. At least 100 per minute
   b. At least 30 per minute
   c. At least 50 per minute
29. Example of thrombolytics include:
   a. Alteplase
   b. Streptokinase
   c. Heparin
   d. None of the above

30. Adverse effects of protamine sulfate include:
   a. Dizziness
   b. Diarrhea
   c. Hypotension and anaphylaxis
   d. Nausea

31. A common antibiotic used in IR when placing ports or stents is:
   a. Cipro (Ciprofloxacin)
   b. Ancef (Cefazolin)
   c. Clindamycin (Cleocin)
   d. Ceftriaxone (Rocephin)

32. Anti-emetics are used to:
   a. Slow conduction to the AV node
   b. Prevent contrast reactions
   c. Vasoconstriction
   d. Decrease nausea, reducing the urge to vomit

33. This anti-arrhythmic drug is commonly used to treat VT and VF:
   a. Lidocaine
   b. Demerol (meperidine)
c. Hydralazine  
d. Angiomax  

34. **Vasopressin causes:**  
a. Hypotension  
b. Athlete’s foot  
c. Constriction of arteries and capillaries  
d. Relaxation  

35. **Narcan (naloxone) can be used to reverse the following drugs:**  
a. Fentanyl, Versed, Morphine  
b. Morphine, Demerol, Fentanyl  
c. Ativan, Fentanyl, Demerol  
d. Ativan, Morphine, Demerol  

36. **Epinephrine is usually the first medication given in all of the following rhythms except:**  
a. Pulseless VT  
b. Atrial fibrillation  
c. PEA  
d. Ventricular fibrillation  

37. **Which of the following is not true about heparin?**  
a. Prevents clot formation  
b. Dissolves existing clot  
c. Can’t be taken orally  
d. Used to maintain patency of indwelling catheters
38. Which of the following statements about Amiodarone is false?
   a. It is an antiarrhythmic drug used for atrial and ventricular arrhythmias.
   b. It can cause bradycardia and hypotension.
   c. It can cause tachycardia and hypertension.
   d. It can cause pulmonary toxicity.

39. This drug can cause profound lactic acidosis in patients receiving contrast media:
   a. Insulin
   b. Epinephrine
   c. Metformin
   d. Phenergan

40. This drug is a potent vasodilator with side effects of headache and hypotension:
   a. Dopamine
   b. Nitroglycerin
   c. Benadryl
   d. Zofran

41. Which of the following is a thrombolytic agent?
   a. Heparin
   b. Insulin
   c. Versed
   d. Alteplase

42. A common side effect of loop diuretics is:
   a. Nephrotoxicity
   b. Electrolyte imbalance, especially hypokalemia
   c. Blindness
43. This opioid can be used to treat rigors after a procedure:
   a. Demerol (Meperidine)
   b. Fentanyl (Sublimaze)
   c. Morphine
   d. Versed (Midazolam)

44. The generic name for Ancef is:
   a. Cefazolin
   b. Ceftriaxone
   c. Cefepime
   d. Ceftazidime

45. Neuro angiography typically requires longer micro catheter and micro wire technology. The Neuro catheters used are usually _____ cm long, the wires _____ cm long and the exchange wires are _____ cm long.
   a. 135, 250, 280
   b. 150, 200, 300
   c. 125, 225, 300
   d. 130, 230, 330

46. The Basilar artery ends at the apex into a bifurcation of what two vessels?
   a. Left and right Posterior Cerebral Arteries
   b. The two Posterior Communicating Arteries
   c. Left and Right Superior Cerebellar Arteries
   d. The Left and Right Vertebral Arteries
47. **The Internal Carotid Artery divides at its end into what two vessels?**
   a. The Medial and Anterior Cerebral arteries
   b. The Anterior and Middle Cerebral arteries
   c. The Facial and Occipital arteries
   d. The Internal Maxillary and Middle Cerebral arteries

48. **The first branch of the Internal Carotid Artery that originates in the cranium is the ________ artery.**
   a. Parenchymal Artery
   b. The Circle of Willis
   c. The Anterior Communicating Artery
   d. The Ophthalmic Artery

49. **The Anterior Communicating Artery is located anteriorly AND connects the left and right Anterior Cerebral Arteries.**
   a. True
   b. False

50. **A Posterior Communicating directly connects behind the Anterior Communicating Artery. True or False?**
   a. True
   b. False

51. **The Circle of Willis is important to evaluate because:**
   a. It is a common choke point for stenoses
   b. The Willis lobe is the brain control center
   c. It provides redundant blood flow
   d. It determines if an aneurysm will rupture
52. **In Subclavian Steal Syndrome, blood is stolen from the:**
   a. Ipsilateral Subclavian Artery
   b. Brain
   c. Contralateral Subclavian Artery
   d. Ipsilateral Subclavian Vein

53. **There are ______ main blood vessels in the neck carrying blood into the brain.**
   a. 2
   b. 3
   c. 4
   d. 5

54. **The ________ arteries _________ into the Basilar Artery.**
   a. Carotid, divide
   b. Carotid, merge
   c. Vertebral, divide
   d. Vertebral, merge

55. **A temporary reduction in blood and oxygen to the brain may result in a:**
   a. Myocardial infarction
   b. Pneumothorax
   c. Transient Ischemic attack
   d. Pulmonary embolism

56. **At what level does the common carotid artery bifurcate?**
   a. C-4
   b. Skull base
   c. C-2
   d. C-6
57. The three layers of an artery include:
   a. Intima, media, adventitia
   b. Intima, media, valve
   c. Inner media, media, outer media
   d. Intima, dermis, adventitia

58. Potential risks of aneurysms include:
   a. Rupture
   b. Embolus
   c. Dissection
   d. Both A and B

59. A pneumothorax is defined as a:
   a. Air accumulation within the pleural space
   b. Air accumulation within the mediastinum
   c. Fluid accumulation within the pleural space
   d. Fluid accumulation with the mediastinum

60. The buildup of fat, cholesterol, and other substances on an arterial wall form hard substances called:
   a. Thrombus
   b. Embolus
   c. Hemorrhage
   d. Plaque

61. A true aneurysm will:
   a. Involve all three layers of the atrial wall
   b. Rupture
c. Only be present at the bifurcations of arteries

d. Only occur in the abdominal aorta

62. The three great vessels off of the aortic arch are the:
a. Brachiocephalic, left common carotid, left vertebral
b. Brachiocephalic, left common carotid, left subclavian
c. Superior vena cava, brachiocephalic, internal jugular
d. Brachiocephalic, left common carotid, right common carotid

63. Tooth abscesses, gallbladder disease, and bacterial infections are all risk factors for:
a. Sepsis
b. Liver failure
c. Mycotic aneurysm
d. Renal failure

64. Risk factors of dissections include:
a. Poor perfusion
b. Aortic insufficiency
c. Thrombus
d. All of the above

65. What area is the most common site of aortic tear?
a. Ascending aorta
b. Transverse Arch
c. Isthmus
d. Inferior Descending Thoracic Aorta

66. Atherosclerosis is most likely to affect a renal artery
a. In the proximal 1/3rd of the artery
b. In the proximal ½ of the artery  
c. In the parenchymal branches.  
d. Atherosclerosis does not affect renal arteries

67. Endovascular repair of a AAA is not indicated until the aneurysm reaches ______cm in diameter, or the patient becomes symptomatic.

a. 6cm  
b. 3cm  
c. 2cm  
d. 5cm

68. The left colic artery anastomosis with the middle colic artery at the:

a. SMA  
b. Celiac  
c. Hepatic flexure  
d. Splenic flexure

69. The first major mesenteric vessel off of the abdominal aorta is the:

a. Celiac  
b. SMA  
c. IMA  
d. Renal

70. The main portal vein is formed by the joining of the:

a. Superior mesenteric vein and splenic vein  
b. Inferior mesenteric vein and splenic vein  
c. Superior mesenteric Vein and inferior mesenteric vein  
d. Left and right portal vein
71. **Budd-Chiari Syndrome results in:**
   a. Thrombosis of the portal vein  
   b. Thrombosis of the hepatic vein  
   c. Thrombosis of the hepatic artery  
   d. Biliary obstruction

72. **May-Thurner occurs when:**
   a. The left common iliac artery compresses the left common iliac vein  
   b. The right common iliac artery compresses the left common iliac vein  
   c. The celiac artery is compressed by a ligament  
   d. The popliteal artery becomes entrapped

73. **When assessing a patient for a percutaneous EVAR, what factors are considered when evaluating the femoral arteries?**
   a. Disease, size, tortuosity.  
   b. Disease, size, patient sex.  
   c. Disease, patient sex, patient age.  
   d. Patient size, disease, tortuosity

74. **A standard injection for a diagnostic aortagram is:**
   a. 15mls per second for a total volume of 30mls  
   b. 8mls per second for a total volume of 16 mls  
   c. 5mls per second for a total volume of 10 mls  
   d. 25mls per second for a total volume of 75mls

75. **Indications for TIPS placement include:**
   a. Hydronephrosis  
   b. Refractory ascites  
   c. Biliary obstruction
d. Inadequate portal perfusion

76. A chronic inflammatory condition that affects the aorta as well as its branches is:
   a. Raynaulds syndrome
   b. Takayasus arteritis
   c. Buergers
   d. Thoracic aortic aneurysm

77. The origin of the SMA can best be visualized in a __________ projection:
   a. 70 degree RAO
   b. 55 degree RAO
   c. Lateral
   d. 80 degree RAO

78. Symptoms of renal artery stenosis may include:
   a. Poor peripheral pulses
   b. Elevated blood pressure
   c. Elevated INR
   d. Decreased appetite

79. The primary artery of the pelvis is the:
   a. Terminal aorta
   b. Common iliac
   c. External iliac
   d. Hypogastric

80. Hematemesis, hematochezia, and fatigue may be symptoms of:
   a. Renal failure
   b. Liver failure
c. Mesenteric bleeding

d. Ruptured aneurysm

81. Nutcracker syndrome occurs when:
   a. The right renal vein is compressed by the celiac
   b. The left renal vein is compressed by the SMA
   c. The right renal vein is compressed by the SMA
   d. The gonadal vein is compressed by the SMA

82. A hemorrhage will result in:
   a. Loss of blood from the circulatory system
   b. Thrombus
   c. Embolus
   d. Infection

83. A pelvic angiogram performed in a 30 degree left anterior oblique will demonstrate the bifurcation of:
   a. Left external/internal iliac bifurcation and right common femoral bifurcation
   b. Right external/internal iliac bifurcation and left common femoral bifurcation
   c. Left external/internal iliac bifurcation and left common femoral bifurcation
   d. Right external/internal iliac bifurcation and right common femoral bifurcation

84. Percutaneous nephrostomies are indicated in patients with:
   a. Hydronephrosis
   b. Elevated INR
   c. Elevated creatine
   d. Renal failure
85. **Klatskin tumors most often occur:**
   a. In the kidneys
   b. At the confluence of the right and left hepatic ducts
   c. In older patients
   d. At the liver hilum

86. **The release of bile into the small intestine is regulated by the:**
   a. Gallbladder
   b. Pancreas
   c. Biliary ducts
   d. Sphincter of Oddi

87. **The liver is divided into how many lobes?**
   a. 5
   b. 10
   c. 7
   d. 8

88. **The ____________ is the functional unit of the kidney.**
   a. Calyces
   b. Renal pelvis
   c. Nephron
   d. Renal pyramid

89. **Complications of percutaneous cholecystostomy placement can include:**
   a. Bile leakage
   b. Septic shock
   c. Hemobilia
   d. All of the above
90. **A Whitaker test can be used to determine:**
   a. If a biliary obstruction is flow limiting
   b. To measure the pressure in the kidney and bladder to determine whether or not a significant obstruction is present
   c. To determine the cause of a renal obstruction
   d. To determine GFR

91. **The ureteropelvic junction is the junction between the:**
   a. Ureter and renal pelvis
   b. Ureter and bladder
   c. Ureter and posterior calyx
   d. Anterior and posterior calyx

92. **The most common benign tumor of the urinary system is:**
   a. HCC
   b. RCC
   c. AML
   d. Klatskins

93. **The functional unit of the liver is the:**
   a. Lobule
   b. Nephron
   c. Sinusoid
   d. Capillary

94. **Right sided PTC punctures are planned:**
   a. Below the Xiphoid process
   b. 2-3cm above the mid-axillary line
c. At the level of the costophrenic angle
d. Below the lowest rib

95. **Indications for percutaneous double J placement include:**
a. Malignant ureteral obstructions
b. Benign strictures in poor operative patients
c. Failed attempts by urology
d. All of the above

96. **Why is the common femoral artery accessed in the mid to lower third of the femoral head?**
a. To ensure a closure device can be used
b. To ensure the puncture is above the femoral bifurcation
c. To ensure the puncture is below the inguinal ligament
d. Both B and C

97. **The common femoral artery bifurcates on the:**
a. Lower 1/3rd of the femoral head
b. Mid-femoral head
c. Upper 1/3rd of the femoral head
d. Above the inguinal ligament

98. **As the superficial femoral artery passes through the adductor canal it becomes the:**
a. Profunda artery
b. Common femoral artery
c. Anterior tibial artery
d. Popliteal artery
99. **The plantar arch is formed by the:**
   a. Radial and ulnar artery
   b. Plantar and Posterior tibial artery
   c. Dorsalis pedis and posterior tibial artery
   d. Anterior tibial and plantar artery

100. **Claudication is defined as:**
   a. Rest pain
   b. Limb ischemia
   c. Non-healing ulcers
   d. Pain with exercise

101. **Superficial veins are connected to deep veins via:**
   a. Valves
   b. Perforators
   c. Collaterals
   d. Capillaries

102. **Backwards flow of blood in veins is prevented by:**
   a. Layers of the vein wall
   b. Perforators
   c. Valves
   d. Collaterals

103. **AV Fistulas are most often created utilizing which artery and vein:**
   a. Brachial and Cephalic
   b. Brachial and Basilic
   c. Axillary and Brachial
   d. Axillary and Cephalic
104. **Clotted fistulas are treated by:**
   a. Ballooning
   b. Restoring venous outflow, and then restoring the arterial inflow.
   c. Resorting arterial inflow, and then restoring venous outflow.
   d. Surgical revision.

105. **Arm swelling and visible collaterals in an AV fistula patient may indicate:**
   a. Arterial stenosis
   b. Central venous stenosis
   c. Stenosis within the fistula
   d. Is not indicative of a problem

106. **In an AV fistula, Radial artery steal is a phenomenon in which:**
   a. The radial artery steals blood from the AV fistula.
   b. The ulnar artery steals blood from the radial.
   c. The AV fistula steals blood from the radial artery.
   d. The AV fistula steals blood from the ulnar.

107. **PICCs are usually placed in which three upper arm veins?**
    a. Brachial, axillary, radial.
    b. Basilic, brachial, cephalic.
    c. Basilic, ulnar, radial.
    d. Brachial, cephalic, radial.

108. **Patient’s experiencing acute renal failure may have which of the following placed for hemodialysis?**
    a. AV Fistula
    b. Permanent dialysis catheter
c. PICC
d. Temporary dialysis catheter

109. **Indications for temporary dialysis lines include:**
   a. Poor vascular access
   b. Chronic renal failure
   c. Acute renal failure
   d. Liver failure

110. **Tunneled lines are generally placed in the:**
   a. Internal jugular vein
   b. External jugular vein
   c. Carotid artery
   d. Subclavian vein

111. **Ports are not indicated for which of the following:**
   a. Chemotherapy
   b. TPN
   c. Iodinated contrast
   d. Blood draws