1. The primary controlling factor of radiography contrast is:
   a. mA    b. time    c. kVp    d. SID

2. The total destruction of microorganisms is accomplished through the use of:
   a. disinfectants    b. sterilization    c. germicides    d. antiseptics

3. Radiographers can control voluntary motion by:
   a. using a high kVp
   b. increasing the length of exposure time
   c. performing the examination in the recumbent position
   d. giving clear instructions to the patient

4. A decrease in technical factors may be required for a patient who has:
   a. edema    b. emphysema    c. atelectasis    d. advanced carcinoma

5. Collimation of the x-ray beam prompts which of the following?
   1.) an increase in radiographic contrast
   2.) reduction of scatter and secondary radiation
   3.) reduction in radiation to the patient
   a. 1 and 2    b. 1 and 3    c. 2 and 3    d. 1, 2, and 3

6. Radiographs of the hands, wrist, feet, and toes are routinely displayed on the illuminator with the digits:
   a. positioned toward the ceiling    c. horizontal and pointed to the left
   b. positioned toward the floor    d. horizontal and pointed to the right

7. All radiographs must be identified with which of the following?
   1.) radiographer's name    2.) patient's name or ID number    3.) right or left marker
   a. 1 and 2    b. 1 and 3    c. 2 and 3    d. 1, 2, and 3

8. Federal guidelines require gonad shielding for which of the following?
   1.) when the gonads lie in the primary beam
   2.) if the clinical objective of the examination is not compromised
   3.) when the patient has reasonable reproductive potential
   a. 1 and 2    b. 1 and 3    c. 2 and 3    d. 1, 2, and 3

9. Which of the following x-ray examinations has the highest average gonad dose for a male patient?
   a. pelvis    b. abdomen    c. lumbar spine    d. gallbladder

10. Which of the following is required to maintain an even radiographic density on body parts that have significant variations in tissue density?
    a. increase the kVp    b. increase the mA    c. use a compensating filter

11. Where are most compensating filters placed?
    a. under the patient    c. between the x-ray tube and skin surface
    b. directly on the patient    d. between the x-ray tube and collimator

12. A plane passing through the body parallel with the midsagittal plane is termed:
    a. coronal    b. sagittal    c. axial    d. oblique
13. The lower, center region on the illustration in the figure above is termed the:
   a. epigastrium  b. lumbar  c. inguinal  d. hypogastrium

14. Approximately what percentage of the population has a sthenic body habitus?
   a. 5%  b. 10%  c. 35%  d. 50%

15. The adult skeleton is composed of how many bones?
   a. 185  b. 200  c. 206  d. 208

16. A rounded process at an articual extremity is called a:
   a. condyle  b. malleolus  c. tubercle  d. styloid

17. The term that refers to parts away from the head of the body, or angling away from the head of the body is:
   a. caudad  b. cephalad  c. medial  d. proximal

18. The term that refers to parts nearer the point of attachment, or origin, is:
   a. distal  b. proximal  c. caudad  d. cephalad

19. Which of the following terms are used to describe "body positions"?
   1.) upright  2.) axial  3.) prone
   a. 1 and 2  b. 1 and 3  c. 2 and 3  d. 1, 2, and 3

20. Which of the following is an x-ray "position"?
   a. mediolateral  b. craniocaudal  c. orbitoparietal  d. Trendelenburg

21. The patient in the figure above is placed in which of the following positions?
   a. RPO  b. LPO  c. RAO  d. LAO

22. The patient in the figure above is placed in which of the following positions?
   a. left lateral  b. right lateral  c. dorsal decubitus  d. ventral decubitus  e. dorsal decubitus  f. ventral decubitus
23. The movement shown in the figure above is:
   a. adduction  b. abduction  c. extension  d. flexion

24. How many phalanges are there in the hand?
   a. 14  b. 27  c. 30  d. 32

25. Which of the following is the largest carpal bone?
   a. capitate  b. hamate  c. scaphoid  d. triquetrum

26. The bone part identified in the figure above is the:
   a. radial notch  b. trochlear notch  c. coronoid process  d. olecranon process

27. For a PA projection of the hand, the central ray is directed to the:
   a. second MCP joint  b. third MCP joint  c. fourth MCP joint  d. third PIP joint

28. The central ray for a PA projection of the wrist is directed to the:
   a. radiocarpal  b. scaphoid  c. midcarpal area  d. third CMC joint

29. The most common IR size and the number of images on the IR for radiographs of the hand are:
   a. 8 × 10 inch (18 × 24 cm), one image  c. 24 × 30 cm, one image
   b. 8 × 10 inch (18 × 24 cm), two images  d. 24 × 30 cm, two images

30. The PA projection of the wrist in ulnar deviation clearly demonstrates the:
   a. trapezium  b. trapezoid  c. hamate  d. scaphoid

31. For the AP projection of the elbow, the humeral epicondyles are:
   a. perpendicular to the IR  c. superimposed over each other
   b. parallel to the IR  d. not clearly seen
32. What position should the hand be placed in for the AP projection of the humerus?
   a. supine                c. lateral
   b. prone                d. 30 degrees oblique, medial rotation
33. Which of the following is the best position to place the patient in for a transthoracic lateral projection of the proximal humerus?
   a. upright                b. supine                c. prone                d. recumbent
34. In order to demonstrate the greater tubercle of the humerus on an AP projection of the shoulder, the epicondyles must be:
   a. in a neutral position
   b. at a 45-degree angle with the plane of the IR
   c. parallel with the plane of the IR
   d. perpendicular with the plane of the IR
35. PA oblique projection of the shoulder (scapular Y) is performed to evaluate:
   a. carcinoma                c. dislocations
   b. fractures                d. soft tissue swelling
36. How many bones are there in the foot?
   a. 14                b. 26                c. 27                d. 29
37. The inferior aspect of the foot is termed the:
   a. posterior                b. caudal surface                c. dorsal surface                d. plantar surface
38. The largest and strongest tarsal bone is the:
   a. calcaneus                c. medial cuneiform
   b. navicular                d. lateral cuneiform
39. The largest and strongest bone in the body is the:
   a. tibia                b. femur                c. hip                d. skull
40. Which projections of the foot will best demonstrate the structural status of the longitudinal arch?
   a. AP axial                c. lateral (lateromedial)
   b. AP oblique, medial rotation                d. lateral (lateromedial) weight-bearing
41. For a lateral projection of the ankle, the central ray must enter the:
   a. navicular                c. medial malleolus
   b. tibiofibular joint                d. lateral malleolus
42. Which of the following must be rotated for all oblique projections of the ankle?
   1.) pelvis                2.) leg                3.) foot
   a. 1 and 2                b. 1 and 3                c. 2 and 3                d. 1, 2, and 3
43. To demonstrate the ankle mortise, the leg and foot should be rotated medially how many degrees?
   a. 15 degrees                b. 20 degrees                c. 45 degrees                d. 15 to 20 degrees
44. The medial and lateral oblique projections of the ankle require the leg and foot to be rotated how many degrees?
   a. 15 degrees                b. 20 degrees                c. 45 degrees                d. 15 to 20 degrees
45. Which ankle projection will clearly demonstrate the "ankle mortise" in profile?
   a. AP
   b. AP oblique, 15 to 20 degrees internal rotation
   c. AP oblique, 45 degrees internal rotation
   d. AP oblique, 45 degrees external rotation

46. What is the position of the femoral condyles when the leg is properly positioned for an AP projection?
   a. perpendicular to the IR
   b. parallel to the IR
   c. at a 15- to 20-degree oblique position (laterally)
   d. at a 15- to 20-degree oblique position (medially)

47. Often, the leg is too long to fit on one IR for radiographs. Which joint or joints should be included on the IR when the site of a lesion is known?
   a. the ankle joint
   b. the knee joint
   c. both joints on two IRs
   d. the joint closest to the lesion

48. The central-ray angulation for a lateral projection of the knee is:
   a. 0 degrees
   b. 5 degrees cephalad
   c. 7 degrees cephalad
   d. 5 to 7 degrees cephalad

49. For an AP oblique projection of the knee, the limb is rotated:
   a. 25 degrees
   b. 30 degrees
   c. 45 degrees
   d. 30 to 40 degrees

50. How much is the knee flexed for a lateral projection of the patella?
   a. 0 degrees
   b. 5 degrees
   c. 10 degrees
   d. 5 to 10 degrees

51. The knee is in the correct position for a lateral projection of the patella if the:
   1.) leg is flexed 20 to 30 degrees
   2.) epicondyles are superimposed
   3.) patella is perpendicular to the IR
   a. 1 and 2
   b. 1 and 3
   c. 2 and 3
   d. 1, 2, and 3

52. Which of the following is the essential method of demonstrating the patella in the tangential projection?
   a. Merchant
   b. Settegast
   c. Hughston
   d. Kuchendorf

53. What is the degree of angulation for the tangential projection of the patella (Settegast method)?
   a. 30 degrees
   b. 45 degrees
   c. perpendicular to the long axis of the femur
   d. variable, depending on the degree of knee flexion

54. How many degrees should the limb be internally rotated for an AP projection of the femur?
   a. 10 degrees
   b. 15 degrees
   c. 18 degrees
   d. 10 to 20 degrees

55. How far should the IR extend below the knee for a lateral projection of the femur?
   a. 1 inch
   b. 2 inches
   c. 3 inches
   d. 4 inches

56. What is the central-ray angle for an AP projection of the hip?
   a. 15 degrees
   b. 20 degrees
   c. 15 to 20 degrees
   d. perpendicular
57. Unless contraindicated, the lower limb and leg should be internally rotated for an axiolateral projection of the hip (Danelius-Miller method). How many degrees of rotation are required?
   a. 10 degrees  
   b. 15 degrees  
   c. 20 degrees  
   d. 15 to 20 degrees

58. Which of the following describes the direction of the central ray for an axiolateral projection of the hip (Danelius-Miller method)?
   1.) perpendicular to the IR
   2.) perpendicular to the long axis of the femoral neck
   3.) perpendicular to the long axis of the femur
   a. 1 and 2  
   b. 1 and 3  
   c. 2 and 3  
   d. 1, 2, and 3

59. What is the respiration phase for the AP projection of the pelvis?
   a. full expiration  
   b. full inspiration  
   c. suspended respiration  
   d. shallow breathing

60. Which of the following vertebral areas have a lordotic curve?
   1.) cervical  
   2.) thoracic  
   3.) lumbar
   a. 1 and 2  
   b. 1 and 3  
   c. 2 and 3  
   d. 1, 2, and 3

61. The part identified in the figure above is the:
   a. vertebral arch  
   b. vertebral foramen  
   c. intervertebral foramina  
   d. transverse foramen

62. The part identified on the vertebra in the figure above is the:
   a. superior articular process  
   b. inferior articular process  
   c. transverse process  
   d. lateral mass

63. The zygapophyseal joints of the lumbar spine form an angle of how many degrees from the posterior midsagittal plane?
   a. 45 degrees  
   b. 15 to 20 degrees  
   c. 30 to 50 degrees  
   d. 70 to 75 degrees

64. Which of the following lines must be perpendicular to the IR for the AP "open mouth" atlas and axis?
   a. glabellomeatal line  
   b. orbitomeatal line  
   c. acanthiomeatal line  
   d. a line drawn from the lower edge of the upper incisors to the tip of the mastoid process
65. The central-ray angle for an AP axial cervical vertebra is:
   a. 10 degrees cephalad  
   b. 20 degrees cephalad  
   c. 15 to 20 degrees cephalad  
   d. variable, depending on the body habitus

66. Where is the central ray directed for a lateral cervical spine?
   a. third cervical vertebra  
   b. fourth cervical vertebra  
   c. fifth cervical vertebra  
   d. seventh cervical vertebra

67. Which projection of the cervical spine will demonstrate the lower five zygapophyseal joints of the cervical spine?
   1.) lateral  
   2.) lateral in hyperflexion  
   3.) lateral in hyperextension  
   a. 1 and 2  
   b. 1 and 3  
   c. 2 and 3  
   d. 1, 2, and 3

68. Where should the arms be placed for a lateral projection of the thoracic spine?
   a. over the head  
   b. flexed in front of the thorax  
   c. at right angles to the long axis of the body  
   d. variable depending on body habitus

69. Which of the following should be performed to reduce the lordotic curvature of the lumbar spine for the AP projection?
   1.) flex the hips  
   2.) flex the knees  
   3.) flex the elbows  
   a. 1 and 2  
   b. 1 and 3  
   c. 2 and 3  
   d. 1, 2, and 3

70. Where is the 35- × 43-cm IR centered for a lateral lumbar spine?
   a. L2  
   b. L3  
   c. the ASIS  
   d. the iliac crests

71. Which of the following is the essential projection used to demonstrate the zygapophyseal joints of the lumbar spine?
   a. AP  
   b. lateral  
   c. AP oblique, RPO and LPO position  
   d. PA oblique, RAO and LAO position

72. To demonstrate the zygapophyseal joints of the lumbar spine, the patient angle is:
   a. 30 degrees  
   b. 45 degrees  
   c. 50 degrees  
   d. 55 degrees

73. Which of the following form the bony thorax?
   1.) sternum  
   2.) 12 pairs of ribs  
   3.) 12 thoracic vertebrae  
   a. 1 and 2  
   b. 1 and 3  
   c. 2 and 3  
   d. 1, 2, and 3

74. Which joints articulate with a vertebra?
   1.) costovertebral  
   2.) costotransverse  
   3.) costochondral  
   a. 1 and 2  
   b. 1 and 3  
   c. 2 and 3  
   d. 1, 2, and 3

75. For which type of body habitus will the diaphragm be at the highest level in the body?
   a. sthenic  
   b. asthenic  
   c. hyposthenic  
   d. hypersthenic

76. How much should the body be rotated for a PA oblique projection of the sternum?
   a. 10 degrees  
   b. 20 degrees  
   c. 5 to 10 degrees  
   d. 15 to 20 degrees
77. Which SID is recommended for the lateral projection of the sternum for management of magnification?
   a. 48 inches  b. 60 inches  c. 72 inches  d. 120 inches

78. How much is the body rotated for an AP or PA axillary projection of the ribs?
   a. 30 degrees  b. 45 degrees  c. 20 to 30 degrees  d. 35 to 45 degrees

79. Which ribs are demonstrated on an AP oblique projection?
   a. upper ribs only  b. lower ribs only  c. side farther from the IR  d. side closer to the IR

80. The thoracic viscera consists of the:
   1.) lungs  2.) mediastinum  3.) diaphragm
   a. 1 and 2  b. 1 and 3  c. 2 and 3  d. 1, 2, and 3

81. The part of the lung that extends above the clavicle is termed the:
   a. apex  b. base  c. hilum  d. lingula

82. How many ribs should be visible above the diaphragm on a PA chest radiograph?
   a. 9  b. 10  c. 11  d. 12

83. For AP oblique projections of the chest, the side of interest is generally:
   a. the side closer to the IR  b. the side farther from the IR

84. How is the central ray positioned for an x-ray projection done with the patient placed in a decubitus position?
   a. vertical  b. horizontal  c. transverse  d. longitudinal

85. If the lateral decubitus position is used to demonstrate fluid in the pleural cavity, which side must the patient lie on?
   a. affected side  b. unaffected side  c. either side

86. Long bone measurement is most frequently applied to the:
   a. spine  b. upper limbs  c. lower limbs  d. femurs only

87. The radiography examination in which a contrast medium is introduced into a joint space and radiographs are made of the joint is called:
   a. arthrosis  b. arthrography  c. arthrogenesis  d. arthroendoscopy

88. Which of the following would be considered a trauma radiography guideline?
   1.) removed all splints
   2.) do not move the patient unless necessary
   3.) obtain a minimum of two radiographs of each body part
   a. 1 and 2  b. 1 and 3  c. 2 and 3  d. 1, 2, and 3

89. How many pairs of salivary glands are there in the mouth?
   a. 2  b. 3  c. 4  d. 5

90. The organ of voice is the:
   a. uvula  b. epiglottis  c. pharynx  d. larynx

91. The liver lies in the:
   a. upper left quadrant  b. upper right quadrant  c. lower left quadrant  d. lower right quadrant
92. The common hepatic duct and the cystic duct join together to form the:
   a. cystic duct   c. common bile duct
   b. pancreatic duct d. common hepatic duct

93. The organ identified in the figure below is the:
   a. lung   b. liver   c. spleen   d. stomach

94. Where is the center of the IR positioned for an AP abdominal radiograph done in the supine position?
   a. L3   b. lower rib   c. at the umbilicus   d. iliac crests

95. What is the respiration phase for an AP abdominal radiograph done in the supine position?
   a. inspiration   c. suspended respiration
   b. expiration   d. slow, deep breathing

96. What is the respiration phase for an AP abdominal radiograph done in the left lateral decubitus position?
   a. suspended
   b. inspiration
   c. expiration
   d. variable, depending on the patient status

97. In the "anatomic position," the palms of the hands are facing:
   a. backward   b. forward   c. up   d. down

98. A fracture of the metacarpal neck is known as a ___ fracture.

99. How much is the central ray angled for the AP oblique projection (Judet method) of the acetabulum?
   a. 0 degrees   b. 10 degrees   c. 12 degrees   d. 15 degrees

100. Which of the following are components of the alimentary canal?
   1.) mouth and pharynx   2.) stomach and intestine   3.) liver and pancreas
   a. 1 and 2   b. 1 and 3   c. 2 and 3   d. 1, 2, and 3

101. The stomach wall is composed of how many layers?
   a. 1   b. 2   c. 4   d. 5
102. The part of the stomach identified in the figure below is the:

- a. greater curvature
- b. pyloric antrum
- c. pyloric canal
- d. pyloric sphincter

103. The muscular opening between the stomach and the duodenum is termed the:

- a. pylorus
- c. pyloric antrum
- b. pyloric sphincter
- d. ileocecal valve

104. The small intestine is divided into how many distinct portions?

- a. 3
- b. 4
- c. 5
- d. 8

105. Which of the following contrast mediums are used for examinations of the GI tract?

- 1.) air
- 2.) barium sulfate
- 3.) water-soluble iodinated solution

- a. 1 and 2
- b. 1 and 3
- c. 2 and 3
- d. 1, 2, and 3

106. The routinely used methods of examining the stomach include:

- 1.) no contrast
- 2.) single contrast
- 3.) double contrast

- a. 1 and 2
- b. 1 and 3
- c. 2 and 3
- d. 1, 2, and 3

107. At which level is the IR centered for a PA projection of the stomach and duodenum?

- a. T12/L1
- b. L1/L2
- c. L2/L3
- d. iliac crests

108. Which of the following will demonstrate the duodenal bulb and loop in profile?

- a. PA
- b. PA oblique, RAO
- c. AP oblique, LPO
- d. AP oblique, RPO

109. For which projection of the stomach would a positioning sponge be used?

- a. PA
- b. PA oblique
- c. AP oblique
- d. lateral

110. Which of the following projections will best demonstrate the fundus of the stomach?

- a. PA
- b. AP oblique
- c. PA oblique, LAO
- d. PA oblique, RPO

111. The first small intestine radiograph is taken how many minutes after the patient drinks barium?

- a. 5 minutes
- b. 10 minutes
- c. 15 minutes
- d. 30 minutes

112. At what level is the center of the IR positioned for a lateral projection of the rectosigmoid area?

- a. ASIS
- b. iliac crests
- c. 2 inches above the iliac crests
- d. 2 inches below the iliac crests

113. The general term used to describe the surgical procedure of forming an artificial opening to the intestine for the passage of fecal material is:

- a. colostomy
- b. enterectomy
- c. enterotomy
- d. enterostomy

114. Compression should not be used during an IVU if the patient has:

- 1.) an iodine allergy
- 2.) an aneurysm
- 3.) a colostomy

- a. 1 and 2
- b. 1 and 3
- c. 2 and 3
- d. 1, 2, and 3

115. How much is the patient rotated from the supine for an AP oblique projection of the urinary system?

- a. 30 degrees
- b. 35 degrees
- c. 40 degrees
- d. 45 degrees
116. The central ray and center of the IR position for a lateral projection of the skull is:
   a. 1 inch below EAM  b. 2 inches below EAM  c. 1 inch above EAM  d. 2 inches above EAM
117. The central-ray angle for the PA axial (Caldwell method) projection of the skull is:
   a. 5 degrees cephalad  b. 10 degrees cephalad  c. 12 degrees cephalad  d. 15 degrees cephalad
118. If the infraorbitomeatal line is placed perpendicular to the IR during an AP axial (Towne method) projection of the skull, how much is the central ray angled?
   a. 15 degrees caudad  b. 30 degrees caudad  c. 37 degrees caudad  d. 45 degrees caudad
119. Which line should be placed parallel to the plane of the IR for the SMV projection of the cranial base?
   a. acanthiomeatal line  b. orbitomeatal line  c. infraorbitomeatal line  d. mentomeatal line
120. For the Waters method, the orbitomeatal line is placed at what angle to the IR?
   a. 30 degrees  b. 35 degrees  c. 37 degrees  d. 55 degrees
121. The sinus identified in the figure below is the:

   a. frontal  b. maxillary  c. ethmoidal  d. sphenoidal
122. Which sinus is projected through the mouth on the open-mouth modification of the Waters method?
   a. frontal  b. ethmoidal  c. sphenoidal  d. maxillary
123. The respiration phase for all projections of the facial bones and sinuses is:
   a. suspended  b. inspiration  c. expiration  d. shallow breathing
124. Which of the following radiographic examinations would give a female patient the highest gonad dose?
   a. limb  b. skull  c. pelvis  d. lumbar spine
125. Gonad shielding is required when the gonads lie within ____ cm from the primary x-ray field.
   a. 3  b. 5  c. 6  d. 8
126. The incomplete separation or avulsion of the tibial tuberosity is known as:
   a. osteosarcoma  b. osteomalacia  c. Paget's disease  d. Osgood-Schlatter disease
127. A comminuted fracture of the ring of C1 is termed a:
   a. comminuted  b. Jefferson  c. hangman's  d. clay shoveler's
128. The angle of the SI joints is ____ degrees relative to the midsagittal plane.
   a. 10  b. 20  c. 25 to 30  d. 30 to 35
129. What type of compensating filter is suggested for the AP projection of the thoracic spine?
   a. wedge  b. double wedge  c. trough  d. Boomerang

130. The area of the brain identified in the figure below is the:
   ![Brain Diagram]
   a. pons  b. cerebrum  c. cerebellum  d. brainstem

131. The largest part of the brain is the:
   a. cerebellum  c. brainstem
   b. cerebrum  d. medulla oblongata

132. The aspiration of a foreign particle in the lung would be termed:
   a. pneumonia  c. viral pneumonia
   b. bronchitis  d. aspiration pneumonia

133. What is the most common arterial site of catheterization for selective angiography?
   a. brachial  b. femoral  c. axillary  d. carotid

134. Inflammation of the bronchi would be termed:
   a. branchioma  b. bronchitis  c. bronchotomy  d. bronchiectasis

135. Blood and body fluid recommendations are issued by the:
   a. CDC  b. ASRT  c. ARRT  d. JCAHO