EXAM NUMBER_____

STRUCTURAL BASIS OF MEDICAL PRACTICE

EXAMINATION I

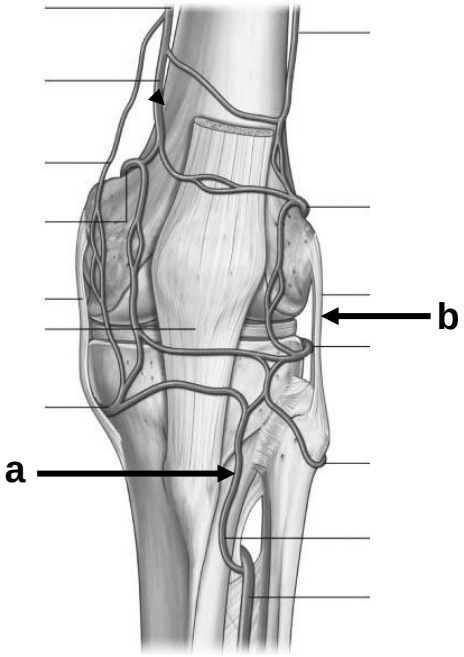
August 25, 2011

PART I. Answer in the space provided. (7 pts)

1. Identify the structures. (1 pt)

   a. _____

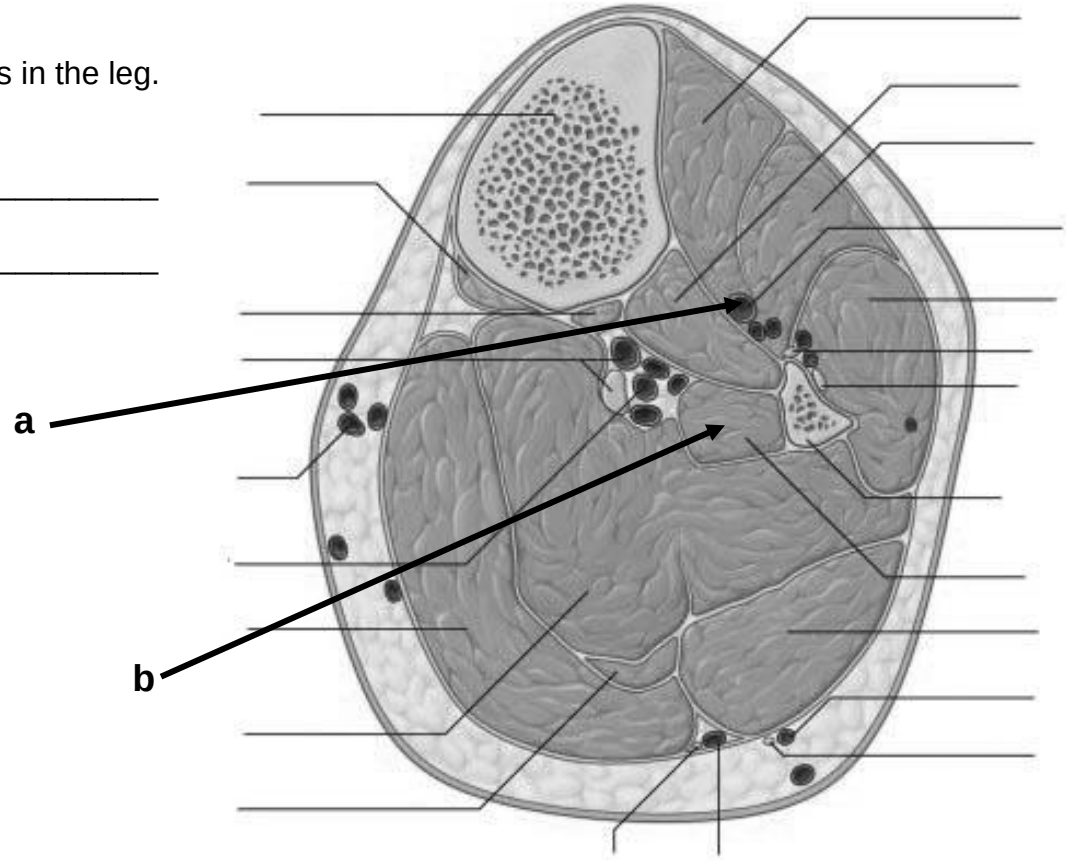
   b. _____



2. Identify the structures in the leg. (1 pt)

   a._____

   b._____

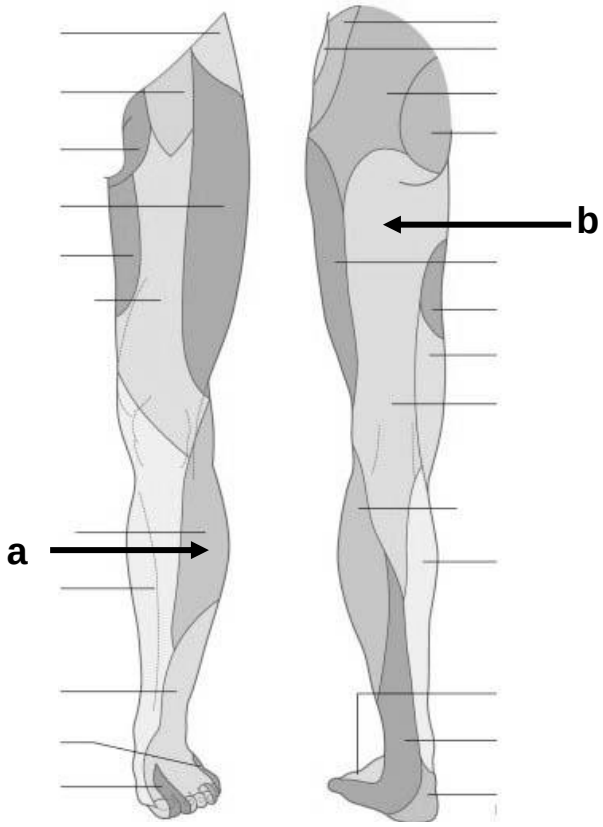


EXAM NUMBER_____

3. Identify the nerves. (1 pt)

a._____

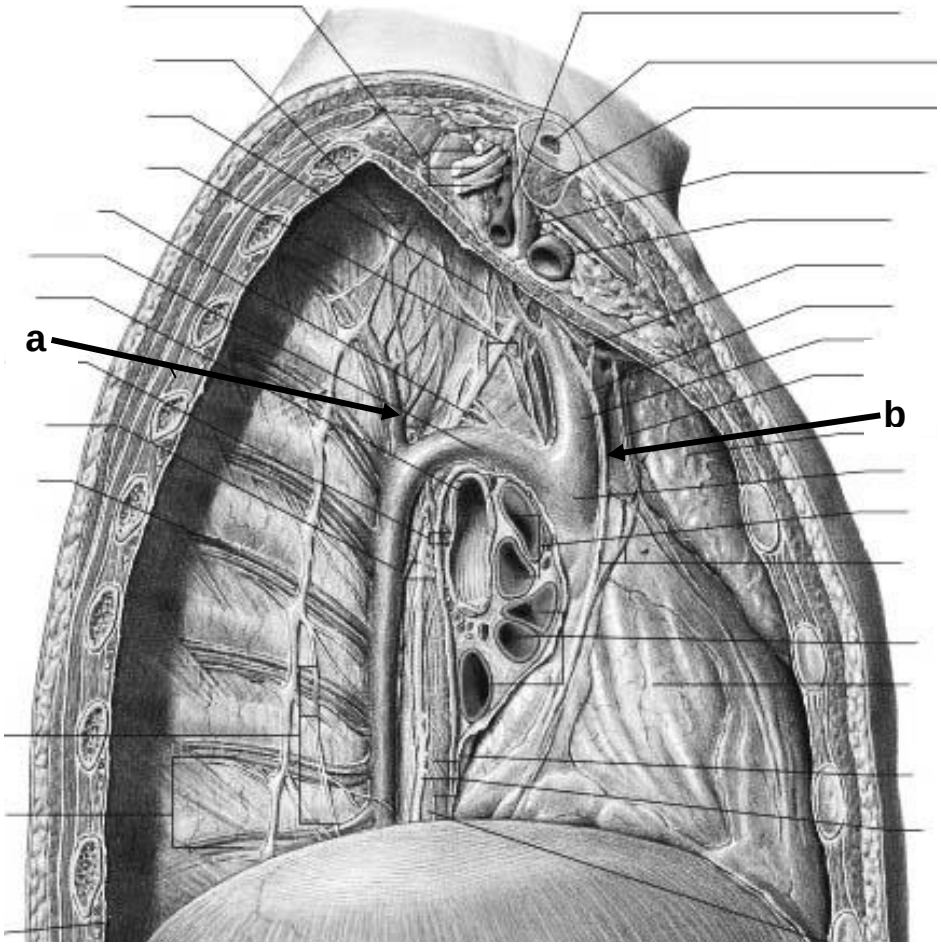
b._____



4. Identify the structures. (1 pt)

a._____

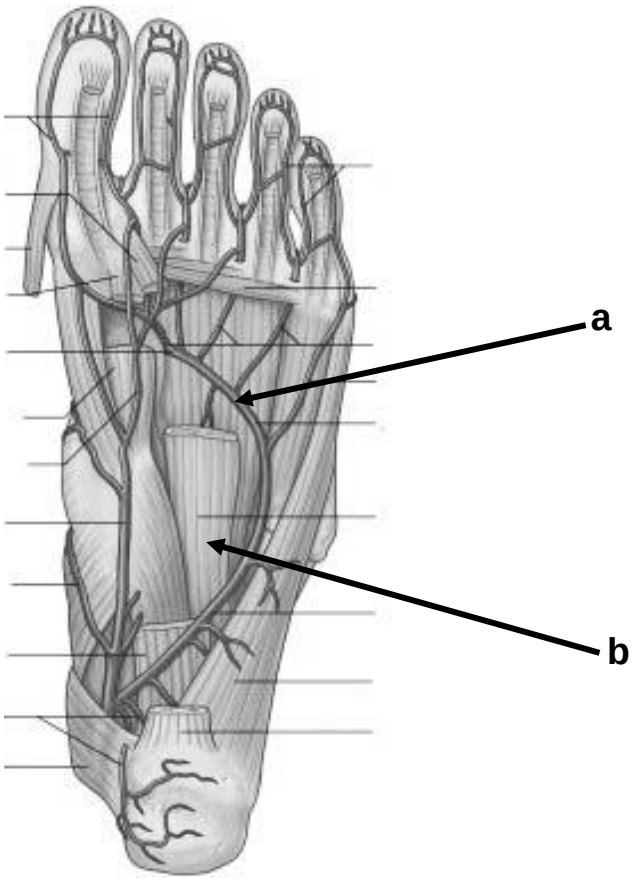
b._____



5. Identify the structures. (1 pt)

a._____

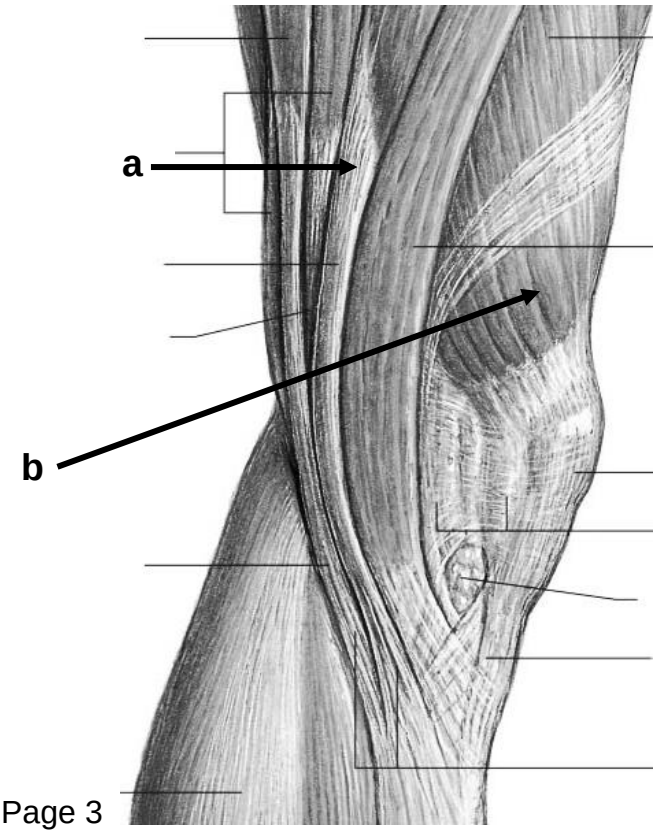
b._____



6. Identify the structures. (1 pt)

a._____

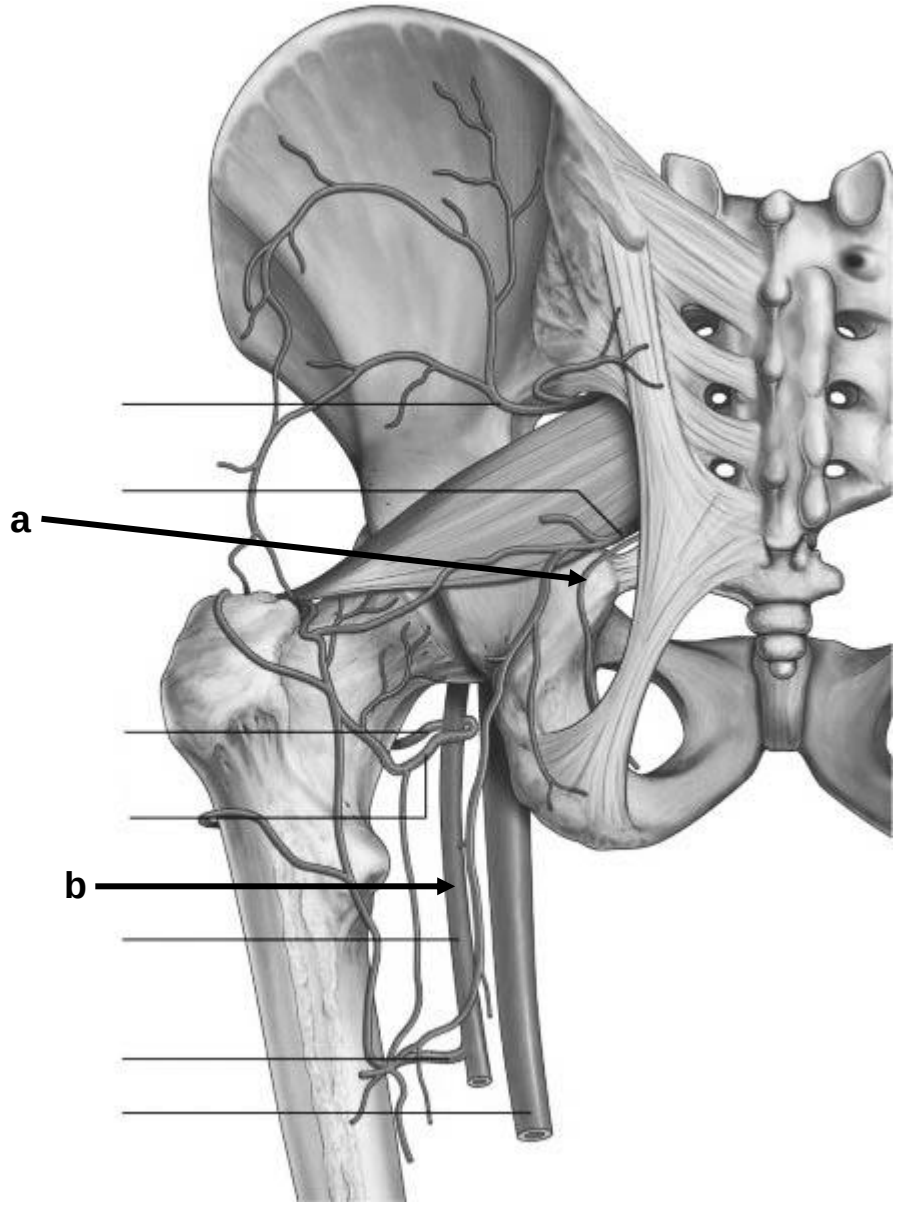
b._____



7. Identify the vessels. (1 pt)

a._____

b._____



Part II. Circle the correct answer. All, none, or some may apply. (27 pts)

1. With respect to the gluteal region:

    a. The sacrospinous ligament is the superior border of the lesser sciatic foramen.

    b. The gluteus minimus inserts into the greater trochanter and rotates the thigh/hip joint medially.

    c. In addition to the iliotibial tract, the gluteus maximus muscle inserts into the linea aspera.

    d. The quadratus femoris laterally rotates the thigh, inserts into the intertrochanteric crest, and lies inferior to the inferior gemellus.

    e. The femoral nerve is formed by the sacral plexus and consists of contributions from L2, L3, and L4.

    f. The spinal cord ends at the level of L2 but the cerebral spinal fluid extends to the level of S2.

    g. The lesser trochanter and ischial spine lie on the same horizontal plane.

    h. Injury to the left superior gluteal nerve can result in pelvic sag when the left extremity is lifted off of the ground.

    i. Intragluteal injections should be placed in the upper outer quadrant.

    j. The pudendal nerve exits the greater sciatic foramen and enters the lesser obturator foramen.

2. In regard to the leg:

    a. The deep peroneal nerve passes through a large oval opening at the superior border of the interosseous membrane to gain access to the anterior leg.

    b. The tendon of the flexor digitorum longus in the foot crosses superficial to the tendon of the flexor hallucis longus.

    c. The superior extensor retinaculum is related to the tendons of the tibialis anterior, extensor hallucis longus, and extensor digitorum longus.

    d. The extensor hallucis brevis joins the extensor hallucis longus to insert on the middle and distal phalanges of the great toe.

    e. The medial calcaneal artery is derived from the peroneal artery.

    f. The popliteus muscle arises from the femur and passes between the lateral meniscus and the capsule of the knee joint.

3. With respect to the joints of the lower extremity:

    a. The synovial membrane lines the articular capsule and covers the articular cartilage.

    b. The ankle is more stable in plantar flexion than in dorsiflexion.

    c. The ligamentum capitus transmits an artery derived from the posterior division of the obturator artery.

    d. The iliofemoral ligament becomes taut in full extension and helps to maintain posture because the line of gravity lies posterior to the hip joint.

    e. The fibular collateral ligament lies deep to the pes anserinus.

    f. The anterior cruciate ligament prevents the posterior displacement of the tibia.

    g. The fibrocartilaginous acetabular labrum attaches to the bony rim of the of the acetabulum and to the transverse ligament of the acetabulum.

    h. The iliofemoral ligament arises from the anterior inferior iliac spine.

    i. The posterior cruciate ligament is intracapsular but extrasynovial.

    j. Inversion and eversion take place at the subtalar and talocrural joints.

4. In regard to respiration:

    a. The right bronchus is wider than the left bronchus, and twice as long.

    b. The apex of the lung projects above the clavicle.

    c. The oblique fissure follows the course of the 4th rib.

    d. A bronchopulmonary segment consists of a 2nd order bronchus, pulmonary artery, and lung tissue.

    e. Respiration is dependent on the costotransverse joint, the articulation of the transverse process with the intervertebal disc of the vertebrae.

    f. The pump-handle movement in respiration expands the anterior-posterior diameter at ribs 1-6.

    g. The endothoracic fascia at the apex of the lung is referred to as the cupula.

    h. Somatic pain fibers can be found in the parietal but not visceral pleura.

    i. The vertical dimension of the thorax increases when the diaphragm contracts.

j. The left bronchial vein drains directly into the azygous vein.

k. The right pulmonary artery is longer and larger than the left.

l. Foreign objects are most likely to lodge in the right bronchus.

5. With respect to the nervous system:

a. Spinal nerve L4 contains a white rami communicans that can transmit a pre-ganglionic sympathetic nerve.

b. The parietal layer of serous pericardium has sensations of touch and temperature.

c. The ventral horn contains somatic afferent nerves.

d. The parasympathetic nervous system is comprised of 2 neurons and ganglia that are of the collateral or intrinsic type.

e. The phrenic nerve innervates the diaphragm but is a somatic nerve.

f. Parasympathetic nerve fibers are not found in collateral ganglia of the sympathetic nervous system.

g. The epicardium of the heart is innervated by the phrenic nerve.

h. The esophageal plexus of nerves is formed by the right and left vagus nerves.

i. The deep cardiac plexus lies anterior to the tracheal bifurcation and consists of post-ganglionic sympathetic nerves and pre-ganglionic parasympathetic nerves.

j. The vagus nerve contains parasympathetic nerves that dilate bronchioles.

6. "This and that":

a. The medial femoral circumflex artery passes between the iliopsoas and pectineus muscles.

b. The posterior intercostal arteries for intercostal spaces 1 and 2 are derived from the aorta.

c. The parietal pleura is derived from somatic mesoderm.

d. The stance phase of locomotion involves plantar flexion.

e. The greater, lesser, and least splanchnic nerves leave the thorax with the esophageal plexus.

f. A dermatome represents the cutaneous distribution of a single spinal nerve.

Part III. Indicate your understanding (characteristics, importance, function, and/or contents) of the following. Answer in the space provided (including back of page). (30 pts)

1. A neonate comes to your clinic and is cyanotic. You diagnose that the patient has transposition of the great vessels. In considering treatment, you keep in mind that the septation and appropriate positioning of the outflow tract of the heart is dictated by development. **State the relationship of the great arteries as they exit the heart in the adult, and explain how they arrived at that position based on your knowledge of embryology.** (6 pts)

2. A 60-year-old patient is in the emergency room with severe chest pain. Electrocardiogram (ECG) and radiographic examinations provide evidence of a significant myocardial infarction and cardiac tamponade (compression of the heart due to a critical increase in fluid volume in the pericardium). Pericardiocentesis - removal of fluid from the pericardial cavity - is required. **Discuss where you would perform this procedure without causing a pnemothorax, and what layers (from outside in) will you penetrate to gain access to the pericardial cavity?** (6 pts)

3. A 24-year-old soccer player sustains a blow to the medial side of the ankle. Radiographic studies reveal damage to the sustentaculum tali. **Discuss the relationships of structures (e.g., ligaments, tendons, vascular supply, nerves) to the sustentaculum tali, and the importance of these structures to gait and ankle stability.** (6 pts)

4. In the course of explorative surgery in the posterior mediastinum, the thoracic duct is lacerated (torn), and requires immediate attention. **Discuss the location, course, and relationships of the thoracic duct in the posterior mediastinum.** (6 pts)

5. A 70-year-old woman presents with a history of three previous myocardial infarctions and is admitted to the hospital with severe chest pain. An electrocardiogram reveals a new myocardial infarction and ventricular arrhythmia. A coronary angiographic study is needed to image the right coronary artery. To perform this procedure you will gain access to the femoral artery in the inguinal region, necessitating knowledge of the saphenous opening. **Discuss the contents, boundaries (i.e., superior, inferior, medial, lateral, anterior, posterior), and relationships of the saphenous opening.** (6 pts)

Part IV. Answer in the space provided (including the back of the page for each question). (36 pts)

1. A 65-year-old male with a history of hypertension and tobacco use presents with right, posterior knee pain that has progressed over the last 3 months. It is aggravated by walking, and he now notes "cramping" below the knee when walking only one block. On exam of the popliteal fossa, a pulsatile mass is noted. An arterial aneurysm is suspected. An angiogram is performed that confirms the diagnosis and vascular surgery is required. The attending surgeon asks you, a 3rd year resident in surgery to: **Discuss the anatomy of the popliteal fossa, and include an account of the boundaries, structures entering and leaving at each boundary, vascular supply, innervation, ligaments, bones, contents, lymphatics, muscles, and relationships**. (12 pts)

2. A 4-year-old boy develops a disseminated streptococcal infection that results in the amputation of both arms above the elbows. In order to compensate in his activities of daily living he learns to use his feet and toes for many of those tasks requiring a degree of dexterity. **Discuss the muscles, ligaments, and nerves involved with flexion, extension, adduction, and abduction of the digits of the foot, and relate this to function**. **Explain why there is more refined movements from flexion than extension of the digits.** (12 pts)

3. A 70-year-old female presents to the emergency department in third degree heart block that requires pacemaker placement. In order to insert the device a catheter is placed in the right internal jugular vein and passed into the right atrium. While placing one of the pacemaker leads into the wall of the right atrium the myocardium is perforated and surgical repair is immediately initiated. At Grand Rounds the following week you are asked to: **Discuss the structure of the right atrium of the heart, including muscles, innervation, vasculature, valves, relationship to the pericardium, anatomical features/landmarks/ orientation, and function.** (12 pts)