DIRECTIONS: Read each question carefully before answering. Understanding the questions is a part of the examination. Answer all questions in the spaces provided on the examination. Print your name in the space provided on the first page and at the top of each subsequent page. This examination consists of 9 questions and 8 pages. It is your responsibility to see that the examination is complete. DO NOT WRITE IN RED. Please write in a legible fashion. If we cannot read your answer, it will be marked wrong.

1. (10 points) Fill in the table with the correct tissues for each structure listed below. If a structure consists of more than one tissue, list all tissues in that structure.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Tissue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cartilage of the external ear</td>
<td></td>
</tr>
<tr>
<td>Endocardium</td>
<td></td>
</tr>
<tr>
<td>Tunica externa of inferior vena cava</td>
<td></td>
</tr>
<tr>
<td>Muscularis mucosae</td>
<td></td>
</tr>
<tr>
<td>Lining of apocrine sweat gland</td>
<td></td>
</tr>
<tr>
<td>Tunica mucosa of the ureter</td>
<td></td>
</tr>
<tr>
<td>Tunica media of an artery</td>
<td></td>
</tr>
<tr>
<td>Vocal fold</td>
<td></td>
</tr>
<tr>
<td>Epimysium</td>
<td></td>
</tr>
<tr>
<td>Labrum</td>
<td></td>
</tr>
<tr>
<td>Stratum papillare of dermis</td>
<td></td>
</tr>
<tr>
<td>Tunica mucosa of the stomach</td>
<td></td>
</tr>
<tr>
<td>Lymph capillary</td>
<td></td>
</tr>
</tbody>
</table>
2. (9 points) Fill in the blanks for the questions that pertain to the illustration of the integument.

What is the name of the dermal portion within the circle that is labeled #1 ________________________

What is the functional significance of structure #1
________________________________________

What is the principal cell of the layer indicated by #2
________________________________________

What is the function of the principal cells in layer #2
________________________________________

Name structure #3 ________________________

Name the secretion produced by #3
_______________________________________

What is the function of this secretion?
_______________________________________

What layer of the skin is indicated by #4?
_______________________________________

Clearly describe the functional significance of the most numerous cells in the deepest stratum of layer #4 ________________________
3. **(9 points)** On the illustration of a section through the knee joint below clearly label, with distinct colors, all the structures listed in the column below. In the box next to each structure indicate the color used to label the structure on the illustration. You must color every structure in its entirety in all parts of the illustration. Partial coloring of a structure will be marked incorrect.

- [ ] Subperiosteal compact bone
- [ ] Subchondral compact bone
- [ ] Articular cartilage
- [ ] Periosteum
- [ ] Spongy bone
- [ ] Medullary cavity
- [ ] Meniscus
- [ ] Fibrous membrane
- [ ] Synovial membrane

4. **(3 points)** Describe three structural features shared in common by a bursa, a synovial sheath, and a synovial capsule.

1. __________________________________________
2. __________________________________________
3. __________________________________________
5. (10 points) Trace a molecule of urea from blood in the aorta, through the kidney, and secrete it as urine and move it to the toilet. Your trace must list all circulatory structures, urinary structures, and any tissue barriers traversed by this urea molecule. Your answer should consist of a sequential columnar list of all structures traversed between the two headings below.

**Urea molecule in blood of aorta**

**Toilet**
6. (14 points) In the space below trace a red blood cell from the capillaries of the right hand to the capillaries of the left foot. Your trace must list all heart chambers and valves, and all circulatory vessels through which the red blood cell travels as it passes between the two capillary beds. Your answer should consist of a sequential columnar list of all structures traversed between the two headings below.

Capillaries of the right hand

Capillaries of the left foot
7. (8 points) Label each labeled item (a through i) in the illustrations below in the associated space below. Answer the questions j, k, and l that pertain to the labels indicated in each these questions.

a. _______________________________

b. (Circled structure) ________________

c. _______________________________

d. _______________________________

e. _______________________________

f. _______________________________

g. _______________________________

h. Within what layer are these blood vessels located?) ____________________________________

i. Describe the importance of the location of structure (i) in the wall of the small intestine and why this is significant. ____________________________________________

j. What is the functional significance of (e)? ____________________________________________

k. Describe how structure (g) would be different in the large intestine. ____________________________

l. What is the functional significance of (c)? ____________________________________________
8. (5 points) Circle the letter next to the correct answer for each question below. You must clearly circle the correct letter. If you circle more than one letter or you are sloppy and we cannot tell which letter is being circled your answer will be marked wrong.

When the human body is in the anatomical position, the palm of the hand faces:
   A. forward
   B. laterally
   C. medially
   D. posteriorly

Which of the following types of cells, found in connective tissue, are the most abundant?
   A. macrophages
   B. adipocytes
   C. mast cells
   D. fibroblasts

Which of the following produce pigment granules?
   A. keratinocytes
   B. Langerhans cells
   C. melanocytes
   D. tactile epithelial cells

Which of these types of cells is a mature bone cell involved in the “day to day” maintenance of bone?
   A. osteoblasts
   B. osteoclasts
   C. osteocytes
   D. osteoprogenitor cells

A ____________ is a type of joint formed where two bones are joined by a pad of fibrocartilage. The intervertebral joints are an example.
   A. syndesmosis
   B. synchondrosis
   C. gomphosis
   D. symphysis

Which of the following contain papillary muscles?
   A. left atrium only
   B. left and right atrium
   C. left ventricle only
   D. left and right ventricles

Which of the following is a feature of veins of the lower limbs but not of arteries of the lower limbs?
   A. tunica externa
   B. tunica interna (intima)
   C. tunica media
   D. valves

Which of the following represents the sequence of the cardiac conduction pathway?
   A. AV node, atria, SA node, ventricles
   B. AV node, SA node, atria, ventricles
   C. SA node, AV node, ventricles, atria
   D. SA node, atria, AV node, ventricles

The trachea is normally located ____________ to the esophagus.
   A. anterior
   B. posterior
   C. medial
   D. lateral

This structure produces digestive juices, insulin, glucagon, and empties them into the duodenum and blood stream.
   A. liver
   B. pancreas
   C. stomach
   D. gallbladder
9. **(7 points)** Fill in the blanks in the sentences below with the correct term.

The hollow joints of the body are called ________________________________.

The ____________________ joint functions as a growth plate and separates the epiphysis from the diaphysis in a growing long bone.

The alveolar ducts arise as many small branches from the __________________________.

_______________________ are structures that bind one bone to another bone.

Fascia is made up of what type of tissue? ________________________________

The solid connective tissue joints of the body are called ________________________________.

The loose connective tissue that surrounds each muscle cell is called the __________________________.

__________________________ and ____________________________ muscle tissue are both involuntary muscle, whereas ____________________________ muscle tissue is voluntary muscle.

The perimysium is a thin layer of ________________________________ tissue that wraps around many muscle cells to form a unit within muscle called a ________________________________.

What is the name of structure #1? ____________________________________________

What forms deep to the epithelium of this structure in its medial edge? ________________________________