Animal Physiology Laboratory Exam I Fall Semester 2007

Name: [Handwritten name]

Multiple Choice: 2 points each

1. A short summary of the content including hypothesis, methodology, and results
   a. Title
   b. Abstract
   c. Introduction
   d. Discussion

2. Primary literature is a collection of sources. Secondary literature is a compilation of articles used to quickly grasp current knowledge in a field of study.
   a. True
   b. False

3. All of the following terms are used to summarize data except:
   a. Mean
   b. Range
   c. Level of Significance
   d. Standard Deviation

Use the tables below to answer questions 4-6:

<table>
<thead>
<tr>
<th>Two Point Threshold for the Palmer Region (cm)</th>
<th>Human</th>
<th>Ape</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>0.2</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>t-Test: Paired Two Sample for Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Variance</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>Pearson Correlation</td>
</tr>
<tr>
<td>Hypothetized Mean Difference</td>
</tr>
<tr>
<td>df</td>
</tr>
<tr>
<td>Stat</td>
</tr>
<tr>
<td>Pr(T&lt;=t) one-tail</td>
</tr>
<tr>
<td>t Critical one-tail</td>
</tr>
<tr>
<td>Pr(T&lt;=t) two-tail</td>
</tr>
<tr>
<td>t Critical two-tail</td>
</tr>
</tbody>
</table>

4. The t-statistic that best matches one you would calculate is ______ and the appropriate critical t value you would compare it to ______.

   a. 0.644658, 0.277129
   b. 2.131846, 0.554258
   c. 0.644658, 2.776451
   d. 0.277129, 0.554258
5. Is there a significant difference between the two species?
   a. Yes
   b. No

6. Which of the following represent the best conclusion?
   a. There is no significant difference between the two point threshold for humans and apes
   b. There is significant difference between the two point threshold for humans and apes
   c. Humans evolved from apes
   d. Humans and apes have the same cutaneous receptors

7. The gastronomius muscle is ________ to the main mass of the frog's body.
   a. Internal
   b. Proximal
   c. Distal
   d. The frog does not have a gastronomius muscle

8. Which term best describes the clustering of cutaneous receptors at different points?
   a. Punctate Distribution
   b. Two Point Threshold
   c. Sensory Adaptation
   d. All of the above

9. Which of the following cutaneous receptors are encapsulated?
   a. Meissner's Corpuscle
   b. Follicular Corpuscle
   c. Merkel Cell (Merkel Disc)
   d. None of the above
   e. All of the above

10. Which answer best describes the movement of gases between the bloodstream and the tissues?
    a. Pulmonary Ventilation
    b. Pulmonary Gas Exchange
    c. Gas Transport
    d. Tissue/Blood Gas Exchange
    e. Cellular Respiration

11. If you calculate the mean duration of each breathing cycle to be 2 seconds per breath, what is the breathing rate?
    a. 30 breaths per minute
    b. 120 breaths per minute
    c. 60 breaths per minute
    d. Not enough information is given

12. According to Boyle's law:
    a. Air is pushed into the lungs by lower atmospheric pressure
    b. Ventilation results from a pressure difference between the pulmonary air and intra-thoracic air
    c. An increase in thoracic volume results in a decrease in intrapulmonary pressure
    d. When thoracic volume increases, the intrapulmonary pressure rises
13. All of the following statements regarding the neuromuscular junction are correct except:
   a. Acetylcholine transmits the nerve impulse across the synapse
   b. The depolarization of the muscle plasma membrane causes the release of Ach
   c. Influx of sodium ions are responsible for the muscle action potential
   d. Motor neurons innervate more than one muscle fiber

14. Which setting in the control panel of LabScribe would you change to find the maximum muscle action potential?
   a. Stimulus Amplitude (Amp)
   b. Pulse Width (W)
   c. Number of Pulses (N)
   d. None of the above

15. The nerve muscle prep was rinsed with Ringer's solution to:
   a. Prevent an electrical short in the nerve conduction chamber
   b. To record the stimulus artifact
   c. Replace sodium ions for action potential generation
   d. Prevent dessication of the nerve/muscle prep
16. Define **FOUR** of the following terms (8 points total). If you define more I will randomly choose which four to grade.

1) **Total Lung Capacity** - the amount of gas in the lung after an maximum inhalation.

Vital Capacity (4800)

2) **Tidal Volume** (500) - the amount of gas that can be inspired and expired during a normal ventilation cycle.

Inspiratory Capacity (3800)

3) **Inspiratory Reserve Volume** (3300) - the maximum amount of gas that can be inhaled after a normal inhalation.

4) **Expiratory Reserve Volume** (1000) - the maximum amount of gas that can be exhaled after a normal exhalation.

Functional Residual Capacity (2200)

Residual Volume (1200)

17. Based on the values listed with the above terms calculate Total Lung Capacity (2 points).

\[
\text{TLC} = (12000) + (1000) + (3300 + 500) = 16000 \\
\]

\[
\text{TLC} = \left(\frac{12000}{\text{TLC}}\right) + \left(\frac{1000}{\text{TLC}}\right) + \left(\frac{3300 + 500}{\text{TLC}}\right) \text{ liters}
\]

\[
= 16000 \\
\]
The Diagram below is representative of the LabScribe Neuromuscular Response window; use this diagram to answer the following questions:

18. Please label the diagram with the following terms (each term may be used more than once) (3 points total): Action Potential, Muscle Response, and Stimulus Artifact.

19. Define the following (2 points each):

   - **Stimulus Artifact** — the response that produces by the electrical stimulus by the researcher.
   - **Action Potential** — all or nothing change in the membrane potential.

20. What are the three mechanisms of contraction for striated muscles (3 points)?

   1) Electrical excitation
   2) Excitation-contraction coupling
   3) Sliding of muscle filaments and contraction.
Multiple Choice: Each question is worth 2 points (28 points total for this section).

1. The main membrane channels responsible for action potentials
   A. Sodium and Calcium
   B. Sodium and G protein coupled receptors
   C. Sodium and Potassium
   D. Sodium and neuronal

2. The maintenance of the resting membrane is a result of
   A. Equal distribution of negative and positive ions
   B. Unequal distribution of ions
   C. Higher concentration of Na⁺ inside and higher concentration of K⁺ outside the cell
   D. Higher concentration of Na⁺ inside and higher concentration of Cl⁻ outside the cell
   E. None of the above

3. The equilibrium potential of a single ion is determined by
   A. Nernst equation
   B. Goldman equation
   C. Both A and B
   D. None of the above

Use the diagram below to answer questions 4 thru 6:

4. Action potential
   A. A.  
   B. B.  
   C. C.  
   D. D.  
   E. E.  

5. Repolarization
   A. A.  
   B. B.  
   C. C.  
   D. D.  
   E. E.  

6. Depolarization
   A. A.  
   B. B.  
   C. C.  
   D. D.  
   E. E.  

\[
\frac{28}{28} + \frac{18}{22} = \frac{178}{200} = 89.46\%
\]
7. The strength of the motor unit is a product of
   A. Muscle size
   B. Nerve size
   C. Number of motor units recruited
   D. Ratio of muscle fiber to muscle size

8. Which one of the following tests would use to measure grip strength
   A. ECG
   B. EMG
   C. ECG
   D. ECG

9. On average, grip strength was greatest in the non-dominant arm.
   A. True
   B. False

10. Innervation of the heart is necessary for the heart to maintain its rhythm.
    A. True
    B. False

11. The correct electrical pathway of the heart
    A. Atrial ventricular node, sinoatrial node, bundle of His, purkenje fibers
    B. Sinoatrial node, atrial ventricular node, bundle of His, purkenje fibers
    C. Atrial ventricular node, sinoatrial node, purkenje fibers, bundle of His
    D. Sinoatrial node Atrial ventricular node, purkenje fibers, bundle of His

12. Heart rate post exercise is generally
    A. Increased
    B. Decreased
    C. Stays the same
    D. Inverted

13. Blood pressure differences in men and women as they age
    A. Increases for men but not women
    B. Women always have higher blood pressure
    C. Is higher in men until age 60 when women have higher blood pressure
    D. Is higher in women until age 60 when men have higher blood pressure
    E. None of the above

14. Blood pressure is measured using which piece of equipment?
    A. Hammer
    B. Beaker
    C. Wax
    D. Sphygmomanometer
    E. None of the above
Essay Short Answer: 2 questions for a total of 22 points

1. Label the diagram below with the following terms (Please make sure you label clearly so I can give you every possible point 😊): P wave, QRS complex, T wave, Systole, Diastole, Atrial Depolarization, Atrial Repolarization, Ventricular Depolarization, Ventricular Repolarization (10 points)
2. Fill in the blanks (Please be specific with regards to phase sounds so that I can give you all the points possible). Each blank is worth 2 points.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Sound</th>
<th>Cuff Pressure (range of Hg in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>A loudest sound compared to other phases.</td>
<td>120-106</td>
</tr>
<tr>
<td>Phase 2</td>
<td>Murmurs</td>
<td>105-85</td>
</tr>
<tr>
<td>Phase 3</td>
<td>Thumping</td>
<td>84-82</td>
</tr>
<tr>
<td>Phase 4</td>
<td>Muffled</td>
<td>81-76</td>
</tr>
<tr>
<td>Phase 5</td>
<td>none</td>
<td>75-below</td>
</tr>
</tbody>
</table>