APPH 4600/6600 Exam 1 2014 Name:_____

Section 1: 10 pt each

1. Sketch a sarcomere and identify significant structures and constituent proteins.

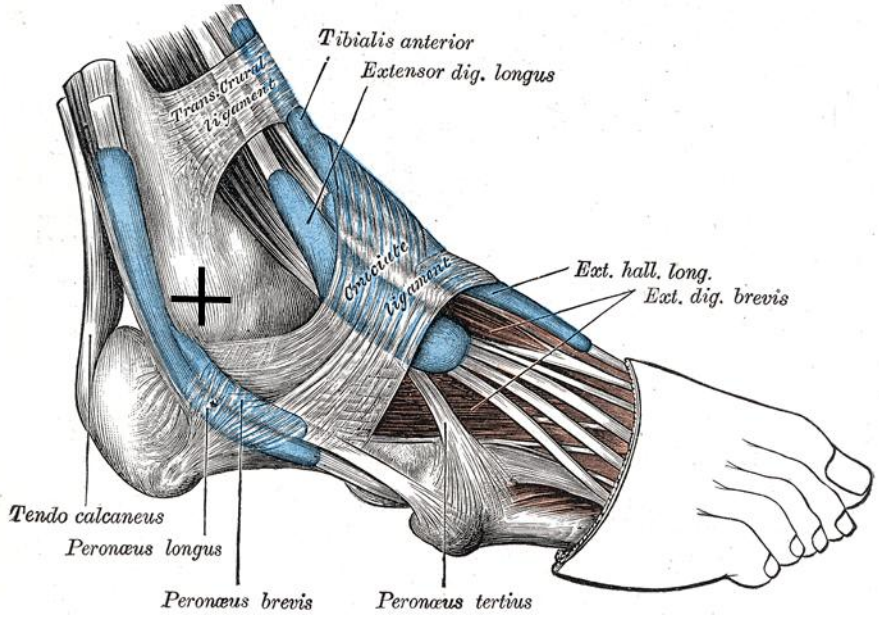
2. Compare and contrast primary and secondary myogenesis.

3. Sketch a muscle spindle organ and identify prominent features.

4. What is a motor unit?

5. What makes Fiber Length and Physiological Cross Sectional Area such useful quantifiers of muscle architecture?

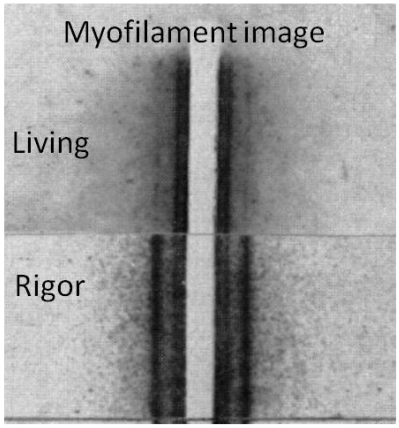
6. In the figure below, draw lines representing the moment arms of Tibialis Anterior, Peronius Brevis, and Soleus (which inserts via Tendo-calcaneus). The "+" represents the center of ankle rotation. How did you choose the specific sites on each tendon to connect? (image from Grey, 1918 via bartleby.com)



Section 2: 5 pt each

7. The pair of Hugh Huxley's X-ray diffraction images below is a key piece of evidence for the cross-bridge theory of muscle contraction. What do they show? That is, what can you infer from the images about the structure that produced each image separately, and what can you infer

from their difference?



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8. Distinguish among myofibers, myofilaments, and myofibrils.

9. What are the "feet" that connect T-tubule and sarcoplasmic reticulum?

10. What is fiber pennation and what is its importance to muscle force capacity?

11. Sketch a myotendinous junction and describe features that improve force transmission.

12. Steep ion concentration gradients are maintained across several cellular membranes. Pick one of these membrane systems, identify the ion gradient that distinguishes that system, and explain the mechanism for establishing the gradient, including the source of energy.

13. Myogenesis depends on growth factor gradients originating outside the somite. Name one of the structures that produce such a gradient, show its relationship to the somite, and the growth factor produced.

14. .Firing rate in spindle and Golgi tendon organ afferents increases similarly during muscle stretch. Why do we describe one as sensing muscle length and one as sensing muscle force?