**BIO 434 WORKSHEET** NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Similarity in Developmental Biology – submit the completed worksheet next lab.

**Exercise 1**

Q1. Which of the proteins from the database are the i) most and ii) least similar to our query?

**Exercise 2**

Q2. How similar do you expect the human and mouse myostatin proteins to be? Rationalize your answer. **(3)**

Q3. If we were to compare the *nucleotide* sequences for the gene encoding this protein between humans and the mouse, do you think they would be relatively similar? Explain. **(4)**

**Exercise 3**

Q4. Were your query and subject sequences identical? Provide evidence for your answer.

Q5. What percent identity is there between these sequences? Is this at all surprising to you? Explain. **(6)**

Q6. Insert a copy of the nucleotide sequence alignment for the mouse myostatin gene from the NCBI website with your submission.

**General Questions**

Q7. In your own words, define and provide an example of bioinformatics.

Q8. What is an E value? A sequence alignment returns a high E value - what does this mean?

Q9. What is myostatin?

Q10. What is the function of myostatin?

Q11. What signaling network does myostatin belong to?

Q12. Summarize the signaling events that occur after a myostatin ligand binds to its cell membrane receptor.

Q13. Knowing that a mutation in the mouse myostatin gene results in muscle hypertrophy, predict what might happen if a similar mutation were to occur in humans. Provide evidence or a rationale for your answer.

Q14. Using evidence gathered during your Bioinformatics exercise and using myostatin as an example, explain whether or not a mouse might be a good model organism for human development.

Q15. Imagine that a colleague asks you to align a conserved metabolic protein coding gene sequence from a dog to its human homolog. Which sequence type, DNA or protein, would you expect to exhibit the highest percentage of identities? Why? **(7)**