

**BIO 5099**  
**Homework Assignment #11**

Name \_\_\_\_\_

Due start of class, **Thursday November 7<sup>th</sup>**.

Late assignments are not accepted; show your work for partial credit.

Assignments may be e-mailed to: christiaan@xiaan.com or rbaror@dmibio.com anytime, or faxed to (303) 556-2889 between 3:00 and 4:00 p.m. on Tuesday.

Define **in your own words** and give an example:

1. (2pts) PolyA tail
  
2. (2pts) Basal transcription factor
  
3. (2pts) Alternative splicing
  
4. (2pts) Spliceosome
  
5. (2pts) Untranslated regions (UTRs)
  
6. (2pts) Enhancer (gene expression)

7. (12 pts) Going from a single gene on a strand of DNA to a mature, active protein, list and **briefly** describe at least **six** distinct points of control that eukaryotic cells employ to regulate the level of an active protein.

8. (6pts) The current consensus is that there are approximately 35,000 human genes and over 100,000 human proteins (still hotly contested!).

a) How do we resolve this apparent contradiction? i.e. discuss what mechanism in eukaryotic cells can account for this discrepancy.

b) It is believed that there are on the order of a thousand transcription factors, with so few transcription factors how can we independently control each gene?

9. (6pts) It was recently discovered that 75% of predicted human proteins have a homolog in the genome of *Fugu rubripes*, a pufferfish. What kinds of proteins might these genes code for? What kinds of proteins might the other 25% code for?

see <http://www.sciencemag.org/cgi/gca?gca=1072104> & <http://www.fugu-sg.org> for additional information (Note: you may need to be connected to the school system to access the article)

10. (4pts) Genetic variation between members of the same species is usually quite small in terms of differences in base pairs and extremely small in terms of gene location within the DNA strands. Identify a possible selection pressure that would fix gene location.