1. (5 pts) A genetic mutation changes the aminoacyl tRNA synthatase that normally adds the aminoacid Phe to tRNAPhe (tRNAPhe is the tRNA that normally brings the amino acid phenylalanine to the ribosome). The mutation causes the enzyme to *also* add Phe to a tRNA that has the sequence 3’-CCA-5’ as its anticodon. How will this mutation affect protein synthesis and the sequence of proteins that are produced by the ribosome? [Hint: see lecture 15 for the codon table].

2. (5 pts) How would the antibiotic Azithromycin affect protein synthesis? Which steps could still occur and which would be prevented in the presence of this antibiotic?

3. (15 pts) A pre-mRNA contains three exons, A, B, C (the “A” represents the branchpoint).



i) How many different mRNAs could be made after splicing, justify your answer (5 pts)?

ii) In one tissue (e.g. liver), the final mRNA contains only exons A and B, while in another tissue (e.g. muscle) the final mRNA contains exons A and C. Illustrate the mechanism by which these two final mRNAs are made. Your diagram should be similar to that found near the bottom of the first page of lecture 21 (10 pts).

4. (5 pts) IGHD II (familial isolated growth hormone deficiency type II) is a genetic deficiency that affects the production of a growth hormone that is needed for the proper development of the newborn. What is the nature of the mutation that causes the disease? Please cite your source.

5. (5 pts) An electron density map can be viewed on the Jmol page for this problem set. The buttons on this page will trace the main-chain through this electron density as well as give you some choices regarding the sidechain of the residue. Determine the amino acid sequence that best fits the experimental electron density. *Briefly justify your answer*. If you are having trouble viewing Jmol pages, try updating Java on your computer and recheck your Java security settings.

6. (5 pts) For the two (A,B) polysaccharides shown to the right.



i) Describe the linkages which connect the monomer units.

ii) Name these two polysaccharides.

iii) Which one is used for energy storage in most organisms?

7. (5 pts) List the similarities and differences between polysaccharides, proteins, and nucleic acids (e.g. monomeric units, connection between units, branching).