Some Review Questions for the Final Exam – Part 2 – Chem 30B

(Note: this selection of problems is **not** comprehensive!)

1. Be able to explain the general steps in:
   a. DNA replication
   b. RNA transcription
   c. protein translation
   d. the electron transport chain and ATP production
2. What are the roles of the three different types of RNA?
3. Why are frameshift mutations more serious than substitution mutations?
4. Look over the steps in glycolysis, the citric acid cycle, and the β-oxidation reactions. Try to find an example of a reaction catalyzed by: an oxidoreductase, a ligase, a lyase, an isomerase, a transferase, and a hydrolase.
5. Compare the digestion of carbohydrates, fats, and proteins.
6. Draw the Fischer projections of glucose, fructose, and galactose.
7. Draw the ring forms of each of the above sugars.
8. What is the difference between D-glucose and L-glucose?
9. How many chiral carbons does galactose contain? How many does fructose contain?
10. Draw the structures of maltose, lactose, and sucrose.
11. Draw the following types of glycosidic bonds connecting two molecules of glucose:
    a. α-1,4 glycosidic bond
    b. α-1,6 glycosidic bond
    c. β-1,4 glycosidic bond
12. What are the differences between glycogen, cellulose, amylose, and amylopectin?
13. What is the difference between an enantiomer and a diastereomer?
14. What is mutarotation, and what is its significance? What types of sugars can undergo mutarotation?
15. List all of the categories of lipids, and explain their structural differences. Give an example of each. What is each category used for?
16. Explain how soaps are made.
17. Explain how soaps clean oily or greasy things.
18. Explain some of the different ways of denaturing proteins.
19. Discuss the different levels of protein structure.
20. Why is the tertiary structure of an enzyme important?
21. Draw the structure of Ile-Arg-Phe-Glu at pH 7.0.
22. For the following types of tertiary structure interactions, give an example of sidechains that would interact in that way.
    a. hydrophobic interactions
    b. hydrogen bonding
    c. disulfide bridges
    d. hydrophilic interactions
    e. salt bridges (ionic interactions)
23. What are some possible functions of proteins in the body?
24. What are the ways in which enzymes speed up reactions?
25. Why does one particular enzyme speed up one reaction and not just any reaction?

26. Discuss the different types of enzyme inhibition.
27. What is a cofactor?
28. Draw the structure of dCMP (deoxycytidine monophosphate).
29. Draw the structure of a trinucleotide of RNA with U on the 5' end, G in the middle, and A on the 3' end.
30. Draw an A-T base pair and a G-C base pair.
31. Here is the sequence of a short section of one strand of DNA. What is the sequence of the complementary strand, and how are the strands oriented relative to each other?
    3' AATTGCGCTATAAGGTCA 5'
32. Given the same sequence as above, determine the sequence of the complementary mRNA. Then determine the sequence of the corresponding protein. (Keep in mind actual DNA, RNA, and proteins are **much** longer than this!)
33. Come up with two possible mutations to the above DNA sequence: one that would make a significant change in the sequence (and therefore structure) of the resulting protein, and another that would not make much of a difference in the structure of the resulting protein.
34. Explain the 3-D structure of DNA.
35. What is an anticodon?

My recommendation for studying:

1. Read through all of your lecture notes.
2. Go over the "things to know" handouts.
3. Make your sheet of notes.
4. Look over your tests, quizzes, and the review problems for all of the exams. If you have time, re-do the problems. If not, at least look over the answers.