CHEM 160A Exam 3 Name _____
December 12, 2003

1) Draw each of the following molecules:

a) (6 points) D-glucose

b) (6 points) α-D-glucopyranose

c) (2 points) α-D-galactopyranose (Galactose is an epimer of glucose at carbon 3.)

d) (6 points) β-D-fructofuranose

e) (4 points) sucrose (α-D-glucopyranose-(1-2)-β-D-fructofuranose)

f) (3 points) maltose (α-D-glucopyranose-(1-4)-D-glucopyranose)

2) (5 points) Explain why glucose is soluble in water but amylose is not soluble in water.

3) (10 points) Compare and contrast amylose and cellulose, in terms of structure, function, and source organism.

4) (8 points) Structurally and functionally, how does amylopectin differ from amylose?

5) (5 points) Structurally and functionally, how does glycogen differ from amylopectin?

6) (2 points) Which one of the following molecules would be most likely to be used as the primary energy source in annual plants?
   a) amylose
   b) cellulose
   c) amylopectin
   d) glycogen

7) (2 points) Which one of the following molecules would be most likely to be used as the primary energy source in oak trees?
   a) amylose
   b) cellulose
   c) amylopectin
   d) glycogen

8) (2 points) Which one of the following molecules would be most likely to be used as the primary energy source in humans?
   a) amylose
   b) cellulose
   c) amylopectin
   d) glycogen

9) (2 points) Structurally, chitin is most similar to which one of the following polysaccharides?
   a) amylose
   b) cellulose
   c) amylopectin
   d) glycogen

10) (12 points) Describe the similarities and differences between DNA and RNA, with regard to their structures and functions.

a) (25 points)
b) On the left side of the page, draw cytidine 5' monophosphate bonded to adenosine 5' monophosphate ($^{5'}$pCpA$^{3'}$), as you would find it in a single strand of RNA. Make sure you show the backbone!
c) On the right side of the page, draw the complementary bases (the bases that base-pair to C and A), showing the hydrogen bonds between bases. (You don't need to show the backbone for this strand.)