Name: _____

Chemistry 114, Spring 2004
Exam 3, April 14, 2004

General Instructions: Read each question carefully and answer each question in the expected format, using proper English grammar, punctuation and spelling.

Part A. Definitions (2 points each)

1. Chiral carbon- carbon w/ four different groups attached

2. epimers are two sugars which differ in the configuration around one carbon, other than the anomeric carbon.

3. Reducing sugar- sugar containing a hemiacetal

4. Keto tetrose is a four carbon sugar which contains a ketone group.

5. Oligosaccharide- carbohydrate containing ~2-9 saccharide residues

6. sphingomyelin is an important lipid of cell membranes based on the alcohol sphingosine.

7. Integral protein- protein which passes through cell membrane

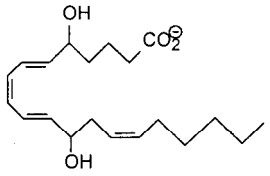
8. Unsaturated is a fatty acid containing one or more double bonds.

9. Essential fatty acid- fatty acid the body can't make; must get from diet

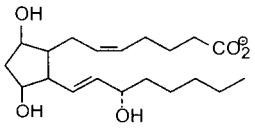
10. lipid is a water-insoluble molecule that can be extracted using a nonpolar solvent such as chloroform.

Part B. Structures

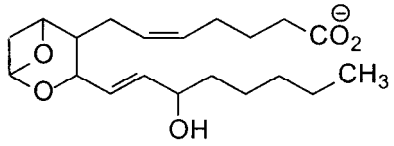
11. Identify the following molecules. (2 points each)

a. 

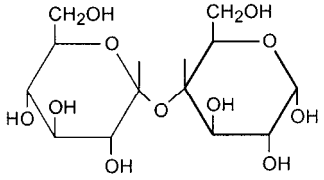
a leukotriene

b. 

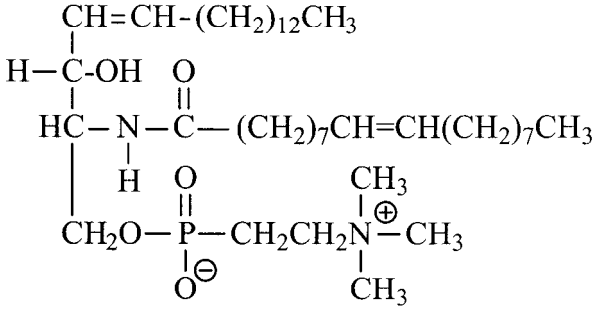
a prostaglandin

c. 

a thromboxane

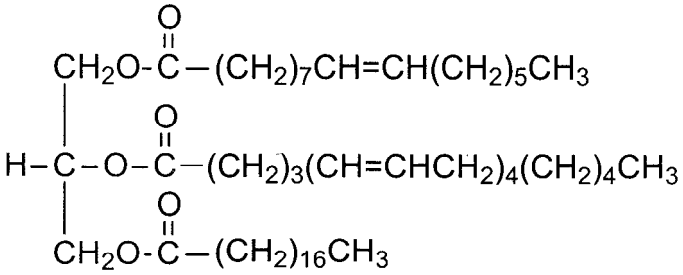
d. 

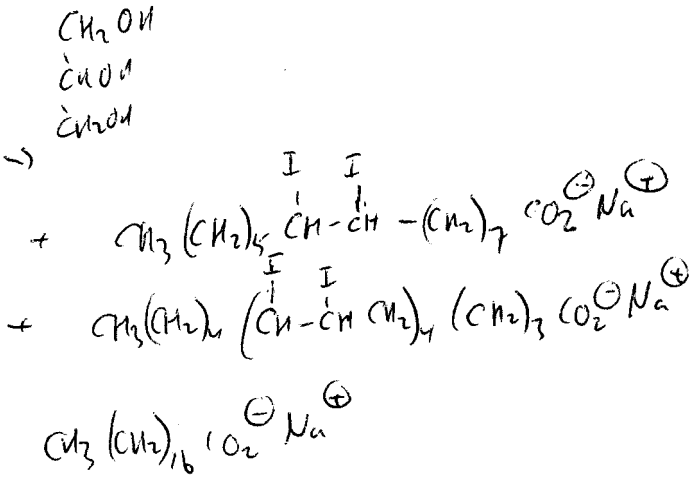
maltose

e. 

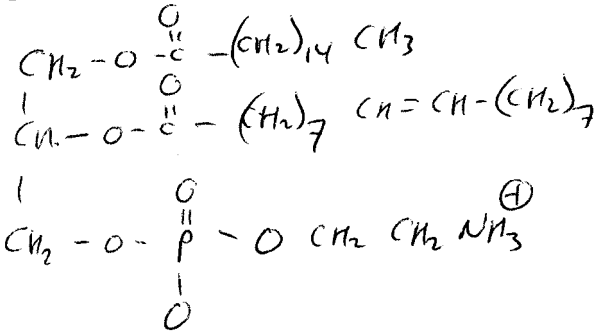
~~phosphatidic~~ Sphingomyelin

12. Indicate the products of the following molecule if it is treated with iodine and then saponified with sodium hydroxide. (TAG) (5 points)

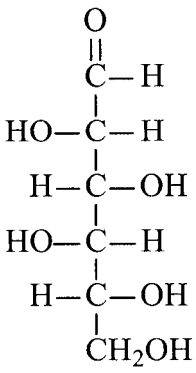


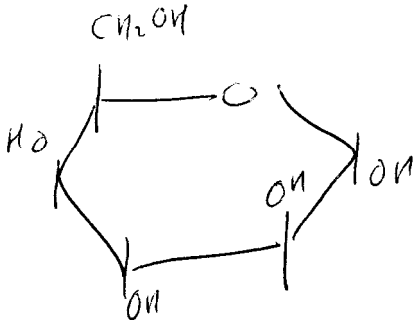


13. Draw a phospholipid containing palmitic acid, oleic acid and ethanolamine. (5 points)

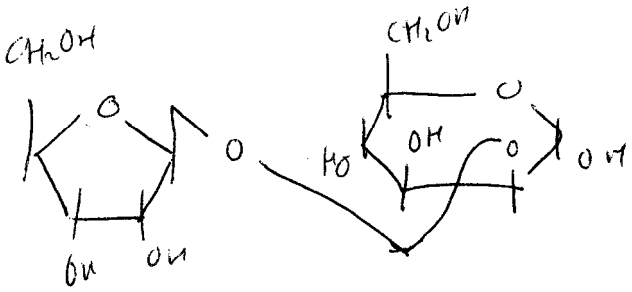


14. Convert the following Fischer projection into a Haworth projection. (5 points)



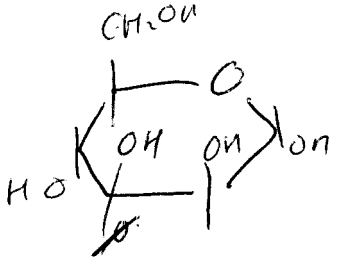


15. Draw the structure of ribose(ß1→2)mannose. (5 points)

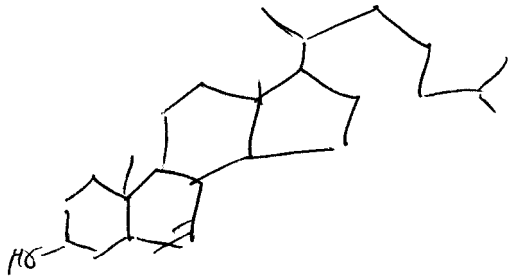


16. Draw the structure of the following molecules

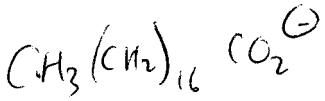
a. α–D–mannose (4 points)



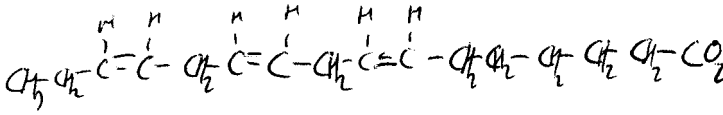
b. Cholesterol (3 points)



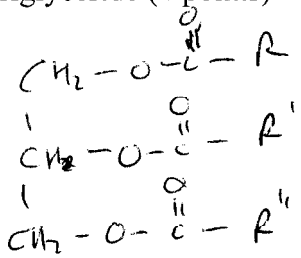
c. Stearic acid (2 points)



d. $16{:}3\Delta^{7,10,13}$ (2 points)

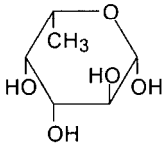


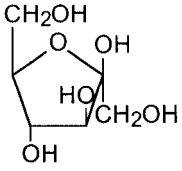
e. A triglyceride (4 points)



(any R, R' or R'' OK)

17. Indicate the requested information for each of the following three molecules.

A.  D or L? (2 points)

B.  alpha or beta? (2 points)

C. $CO_2^{\ominus}(CH_2)_4CH{=}CHCH_2CH_2CH_3$ according to the omega (ω)system (1 point)

10:1 $\Delta^6$ ω-4

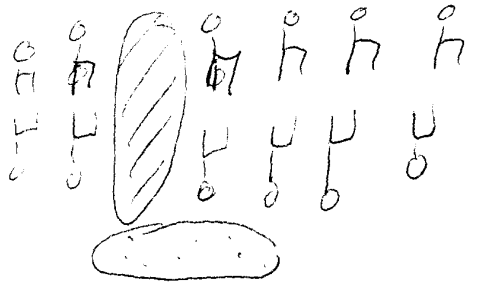
Part C. Concepts and Applications thereof

18. Explain why lettuce is pushed as something good to eat for those persons who are dieting. (5 points)

the β1 → 4 linkage is not digestible, therefore

0 calories per gram

19. Diagram and describe a membrane in terms of the fluid mosaic model. (10 points)



A phospho lipid bilayer( ) containing integral membrane

proteins and peripheral proteins , all

of which are able to move around in the membrane

20. Explain the difference(s) between a fat and an oil and describe the structural features of each. (5 points)

| | Fat | Oil |
|---|---|---|
| Structure | tris | tris (same) |
| State | solid @ RT | liquid @ RT |
| Fatty acids | predom, sat. | predom unsat. |

21. List the fat soluble vitamins and one water soluble vitamin. (5 points)

A D E K $B_{12}$, C ...

22. Describe the importance of cholesterol to a mammalian organism. (5 points)

It is a precursor of all steroid molecules such as progesterone, estrogen, testosterone, others