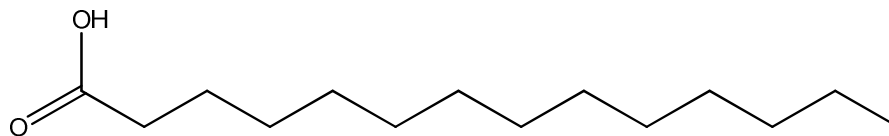
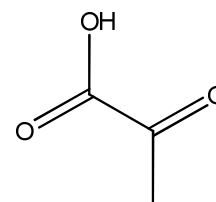


1. Given the molecule:



- What type of molecule is this?
- Give the common name and Δ symbol of this molecule.
- In which of the following classes of compounds might you find this molecule as a substituent (or component)? Choose all that apply:

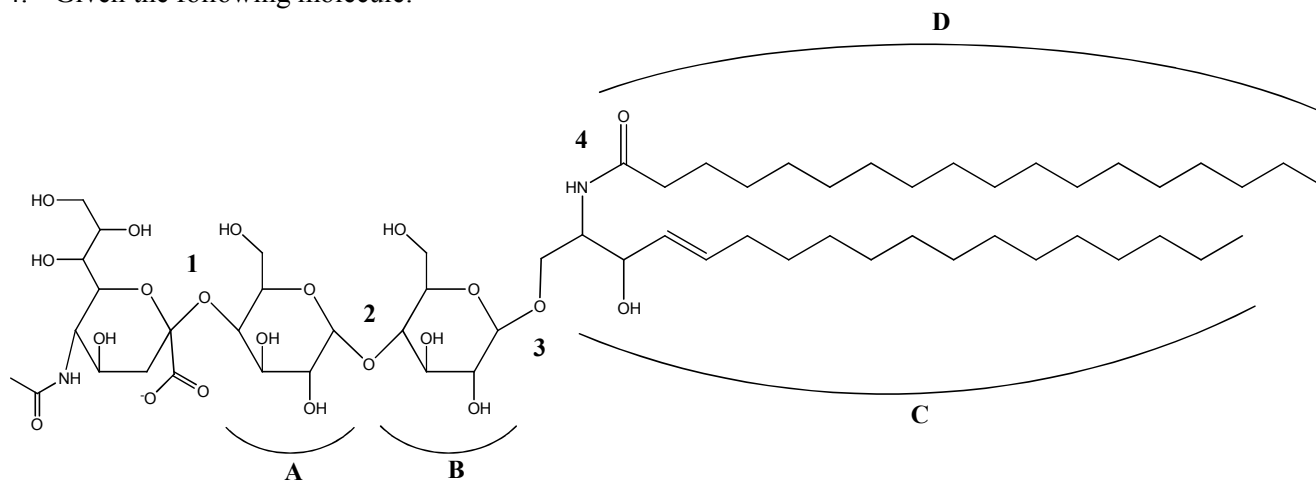
A. glycosaminoglycans	F. lipoproteins
B. gangliosides	G. cerebroside
C. sphingophospholipids	H. glycerophospholipids
D. triglycerides	I. glycoproteins
E. glycans	
- True or false? This molecule can form micelles in aqueous solution.
- True or false? Under physiologic conditions, this molecule can act as a hydrogen bond donor.
- The structure of pyruvate, an intermediate in the breakdown of sugars, is shown to the right. Would you expect the pK_a of pyruvate's carboxyl group to differ from that of the molecule above? If yes, which pK_a would be lower and why? If no, why wouldn't they differ? (Explain in 40 words or fewer.)



- Multiple Choice. Which one of the following statements is correct?
 - The melting point of linoleic acid is higher than that of oleic acid.
 - Peripheral membrane proteins can be identified by stretches of hydrophobic amino acids in their sequence.
 - A membrane's fluidity increases with increasing saturation of its lipids.
 - Phosphatidylcholines are a type of membrane glycerolipid.
 - None of the above.
- The hot springs of Yellowstone National Park teem with algae, bacteria, and archaea that are able to grow at temperatures close to 100°C . These organisms are called 'thermophiles' because of their ability to thrive in hot temperatures. Considering *only* the environmental temperature, rank the following fatty acids in order of their likely abundance in the plasma membranes of thermophilic bacteria:

a. stearic acid	d. 18:3, ω -3
b. lauric acid	e. 20:0
c. oleic acid	f. 16:1 (Δ^9)

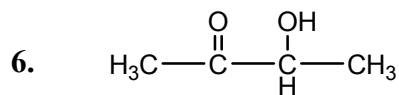
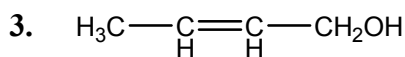
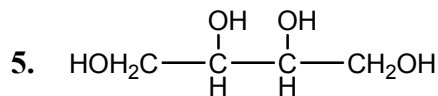
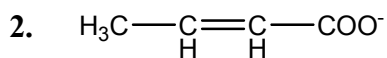
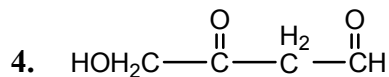
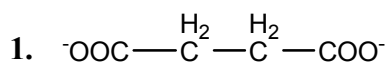
4. Given the following molecule:



- To what class of compounds does this molecule belong? *Be as specific as possible.*
 - Give the common names of the individual components of this molecule (as indicated by the brackets labeled A-D).
 - Name the types of linkages in this molecule (as indicated by the numbers 1-4). *Be as specific as possible.*
 - What is the function of this type of molecule?
 - Where in the cell would you expect to find this type of molecule? *Be as specific as possible.* (15 words or fewer)
 - True or False? This molecule is a glycoconjugate.
 - Would you expect concentrations of this type of molecule to be higher in animals living in the arctic or in the tropics? Explain why in 40 words or fewer.
5. Multiple choice. Which one of the following statements is correct?
- Transbilayer diffusion of lipids is slow because of the flexibility of the membrane.
 - Carbohydrates are a major component of biological membranes.
 - Membrane proteins always have a region inserted into the membrane.
 - Different regions of a membrane can have different proportions of proteins and lipids.
 - Glycolipids can be found in the inner leaflet of the plasma membrane.
 - None of the above.
6. Which one of the following statements is *incorrect*?
- The inner and outer leaflets of the plasma membrane differ in composition.
 - The hydrophobic effect plays a different role in the folding of integral membrane proteins than in cytosolic proteins.
 - Cholesterol is a component of lipid rafts and helps to stiffen the membrane.
 - Some integral membrane proteins do not span the bilayer.
 - Glycerophospholipids are amphipathic and form micelles and bilayers in aqueous solution.

7. Given the following types of interactions:
- van der Waals contacts
 - hydrogen bonds
 - ion pairs
 - disulfide bonds
 - hydrophobic effect
- Which would you expect to see between a membrane protein and the membrane (choose all that apply).
 - Which one is most important between an *integral* membrane protein and the membrane?
 - Which one is most important between a *peripheral* membrane protein and the membrane?
 - Which one is the strongest in proteins?
 - Which one is most important in stabilizing protein secondary structure?
 - Which one is most important in stabilizing polysaccharide structure?
 - Which one is most important in the formation of a bilayer?
8. True or False? The greater flexibility of saturated fatty acids (versus unsaturated) produces greater flexibility in a membrane bilayer.
9. True or False? Circular dichroism is a spectroscopic technique that can be used to measure protein secondary structure.
10. True or False? Patterns of absorption of infrared light can give insight into a protein's structure.

11. Given the following compounds:



- Which two have the same oxidation state?
- Which is/are more oxidized than compound 2?
- Which is the most reduced?