BCMB 8020 Exam III **Name:** _____

Dr. Schmidt - Lectures 5-16 **March 4, 2003**

1. Lipids can be classified into two broad groups. List them. (2 points)

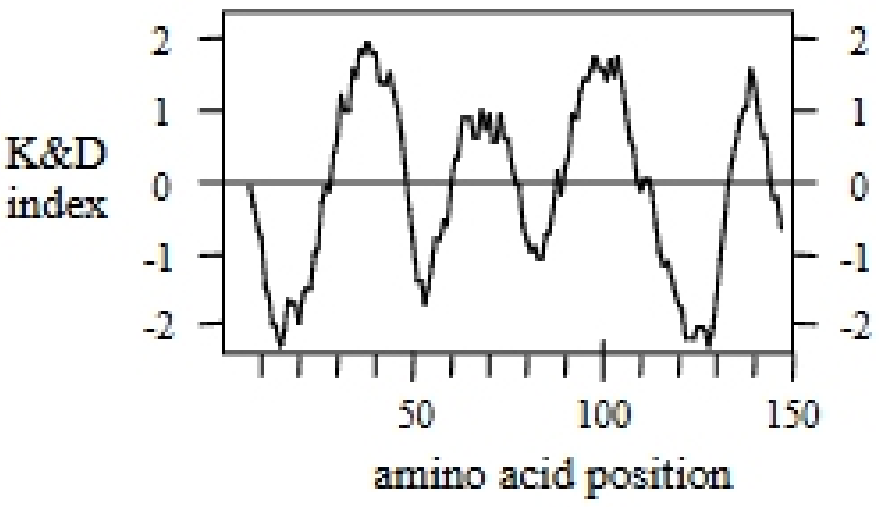
2. Draw the general structure (*i.e.*, a cartoon) of a generic membrane phospholipid AND identify the key parts of the structure. (4 points).

3. Which molecule (larger than an atom) is used as a precursor in the synthesis of all lipids? (1 point)

4. Which nucleotide triphosphate (NTP) is required for glycerophospholipid synthesis AND which of the NTP phosphate groups is specifically incorporated into the lipid? (2 points)

5. List the lipid(s) that specifically incoporate phosphatidic acid? (2 points)

6. Identify the predicted membrane spans in the following Kyte and Doolittle hydropathy plot using shading and numerical identifiers (I, II, *etc.*) AND depict the possible topology/topologies for this protein. (4 points)



7. What are the features of the targeting signal that directs a protein to the general Sec-dependent secretion system in prokaryotic organisms? Describe OR depict with descriptive labels (4 points)

8. List the different types of protein lipidation AND indicate whether they are typically found on intracellular or extracellular molecules. (5 points)

9. List the amino acids that can be modified by phosphorylation? (4 points)

10. List factors, as defined in lecture, than can influence proteolytic mechanisms. (3 points):

11. Provide examples of TWO protein-protein interaction domains AND define the motif that they interact with. (3 points)

12. List the four basic principles of signal transduction, as defined in lecture. (4 points)

13. Describe the role(s) of the basic components/modules of a GPCR signal transduction system. (6 points)

14. Draw/Depict in cartoon fashion the general structural features of ABC proteins (use descriptive labels). (3 points)

15. Label each blank to indicate whether the term is typically indicative of a Channel (C), Active Transporter (T), or Both(B)? (4 points)

____ Continuous pore
____ Easily saturable
____ Energetically uphill transport
____ Energetically downhill transport
____ ATP requiring
____ Fast, relative to passive diffusion
____ Cargo specific
____ Facilitated

16. Briefly compare AND contrast the properties of aquaporin and OmpF porin channels in terms of A) secondary structure, B) quaternary structure, C) pore location, and D) pore selectivity. (8 points)

17. Briefly describe the biophysical properties that make fluorochromes a good FRET pair? (6 points)

18. What is the basis for the differential effects of TPCK and TLCK on Chymotrypsin and Trypsin? (4 points)

19. The farnesyltransferase (FTase) and geranylgeranyltransfersase I (GGTaseI) share a common α subunit and have distinct β subunits. The FTase β subunit can bind both farnesyl bisphosphate (Fpp) and geranygeranyl bisphosphate (GGpp), but only Fpp is efficiently utilized as a substrate. Briefly describe why this is the case. (3 points)