1. Explain how phosphorylation and the binding of a nucleotide can both be used to regulate protein activity. What do you suppose are advantages of either form of regulation (10 %)?
2. The structure of a lipid bilayer is determined by the particular properties of its lipid molecules. Please describe
   A. What is a lipid bilayer? (5 %)
   B. The properties of lipid bilayer and the characteristics of a cell plasma membrane. (12 %)
3. Describe "oxidative phosphorylation". (8 %)
4. What is receptor-mediated endocytosis? Please use low-density lipoproteins, or LDL, as an example, describe how LDL enters cells via such pathway. (15 %)
5. Explain why cyclic AMP must be broken down rapidly in the cell to allow rapid signaling. (10%)
6. It is generally thought that genetic variation is beneficial for a species because it enhances its ability to adapt to changing environment. Explain why cells go to great lengths to assure the fidelity of DNA replication. (10%)
7. What do you suppose happens in mutant cells that
   A. cannot degrade cyclins? (5%)
   B. express abnormal p53? (5%)
8. Epithelial cells lining the gut are renewed frequently whereas most neurons last for the lifetime of the organism. Why? (10%)
9. Eucaryotic cells, especially animal cells, have complex cytoskeletons including actin, microtubules and intermediate filaments. Please explain why this is the case. (10%)