

Biochemistry 2280A/ 2288A October 12<sup>th</sup> Term Test

1. Which is true? Most cells...

- a) have the same amount of DNA
- b) use ATP as their principal energy currency**
- c) are the same size
- d) require oxygen
- e) divide once

2. Yeast are simple organisms, yet they contain many of the elements of a typical eucaryotic cell. Which of the following is/are not found in a yeast cell?

- a) Golgi apparatus
- b) Nucleus
- c) Mitochondria
- d) Chloroplasts**
- e) Endoplasmic reticulum

3. Which of the following is false?

- a) Most biological discoveries have involved an in depth analysis with one discipline.**
- b) Some yeast proteins are more than 70% identical to their human counterparts.
- c) Evolution is an ongoing process.
- d) *E. coli*, yeast, flies, nematodes and mice are examples of model organisms.
- e) Biochemistry is the study of the molecules of life

4. Which of these amino acids is not an amino acid, strictly speaking?

- a) C
- b) F
- c) D
- d) G
- e) P**

5. A residue that can be phosphorylated after incorporation into a protein.

- a) K
- b) S**
- c) G
- d) P
- e) none of these

6. What would be the net charge of lysine at pH 10? Assume the pKa of the alpha-carboxyl group = 2.0 and the pKa of the alpha-amino group = 10.0. Assume the pKa of the side chain is 10.0.

- a) +1.0
- b) +0.9
- c) 0**
- d) +0.5
- e) +0.1

7. What would be the net charge of aspartic acid at pH 3? Assume the pKa of the alpha-carboxyl group = 2.0 and the pKa of the alpha-amino group = 10.0. Assume the pKa of the carboxyl side chain is 4.0.

- a) +1.0
- b) +0.1
- c) 0**
- d) -1.0
- e) +1.1

8. The concept of protein domains is very important in understanding protein structure. Which of the following statements about protein domains is **FALSE**?

- a) They can be produced by any part of a polypeptide chain that can fold independently into a compact, stable structure.
- b) Different domains of a protein are often associated with different functions.
- c) Domains consist of individual, separate polypeptide chains.**
- d) Domains often move relative to each other in the course of protein function.
- e) Different protein domains are usually connected by relatively unstructured lengths of polypeptide chain.

9. The coiled-coil structure is found in some proteins. Which of the following statements regarding the coiled-coil is **TRUE**?

- a) is a type of secondary structure
- b) involves three alpha helices
- c) is stabilized by a hydrophilic center
- d) is characterized by a repeating pattern of 5 residues
- e) is a type of quaternary structure**

10. Which one of the following protein/ligand pairs has the highest affinity for each other? The dissociation constant for each pair is given in parentheses.

- a) Calmodulin/Calcium (0.1  $\mu\text{M}$ )
- b) antibody/antigen (1  $\mu\text{M}$ )
- c) cAMP/PKA (1 nM)
- d) estrogen receptor/estrogen (0.1 nM)
- e) Avidin/biotin (1 fM)**

11. In the formation of procollagen, which of the following amino acids is the most critical to allowing the close association of three polyproline type II helix molecules, resulting in the formation of a triple helix?

- a) proline
- b) serine
- c) hydroxyproline
- d) alanine
- e) glycine**

12. Which of the following statements about a competitive inhibitor of an enzyme-catalyzed reaction is **FALSE**?

- a) A competitive inhibitor may resemble the substrate or product
- b) A competitive inhibitor affects the  $V_{\text{max}}$  of the reaction**
- c) A competitive inhibitor binds to the active site of the enzyme
- d) A competitive inhibitor affects the  $K_{\text{M}}$  of the reaction
- e) A competitive inhibitor results in Lineweaver-Burk plots in which the inhibited and uninhibited lines intersect at the y-axis

13. Your friendly neighbourhood scientist has calculated that the Michaelis constant for her favourite enzyme is 3M. She knows that the maximal velocity for this enzyme is 5M/min when the substrate concentration is 2M. What is the initial velocity of the enzyme (units: M/min)?

- a) 5
- b) 4
- c) 3
- d) 2**
- e) 1

14. For a particular protein, if the pH is above the pI of the protein, which of the following statements about the protein is **FALSE**?

- a) it will have a net negative charge
- b) it will bind to a DEAE column
- c) it will have a net positive charge**
- d) it will stick to a positively-charged column
- e) it will flow unhindered through a negatively-charged column

15. If phosphate groups were attached to a chromatography column matrix

- a) the column will bind cations**
- b) large proteins are excluded
- c) negatively charged proteins will bind
- d) the matrix will become hydrophobic
- e) the column will build anions