BIOCHEM 461-0102
Dr. Ebrahimian
Exam #2
October 26, 2000

Name _____

SS# _____

This is a closed book exam. Please write your name on all pages and write your answers **legibly**. No study aids are allowed for this exam. Read questions carefully and answer completely.

Grade summary:

question	1	20 points	_____
	2	18	_____
	3	27	_____
	4	35	_____

1a) Describe three important features of β-sheet polypeptide structure. Provide your answer in terms of backbone and side chain arrangements and stabilizing forces involved. (9 pts)

1b) Describe two different types of β-sheet structures and compare them in terms of stability. (6 pts)

1c) What is the most likely location for proline and glycine in a β-sheet structure? Explain. (5 pts)

2) From a crime scene, a number of samples were collected from hair, skin, and clothing to be analyzed. Unfortunately, these samples were mislabeled. One fiber that was found in abundance had the following the amino acid composition:

Gly 33%, Pro and HyPro 30%, Lys15%,

2a) Considering the amino acid composition, identify this fibrous protein and describe its structure. (6 pts)

2b) Explain how the unusual amino acid composition of this protein contributes to its overall structure and stability. You need to discuss the role of each amino acid in relation to structure and stability. (12 pts)

3) The most recently discovered protein in a laboratory was labeled YFP (your favorite protein). YFP is a single-domain globular protein with 98 amino acids, 3 disulfide bonds and 7 proline residues. This protein was used for folding studies where urea and 2-mercaptoethanol were used for denaturation. When these reagents were removed and suitable conditions for refolding were established, the protein regained its full activity and native conformation within 2.5 hours.

3a) What is a domain? (5 pts)

3b) What are the effects of urea and 2-mercaptoethanol on YFP? (6 pts)

3c) During purification of YFP, several treatments were applied to separate this protein from other cellular components in solution. What are the effects of the following treatments on YFP? Provide a brief explanation for each answer. (5 pts <u>each</u>)

- Used very high concentrations of ammonium sulfate (salt)

-Adjusted the pH of the solution to YFP isoelectric point

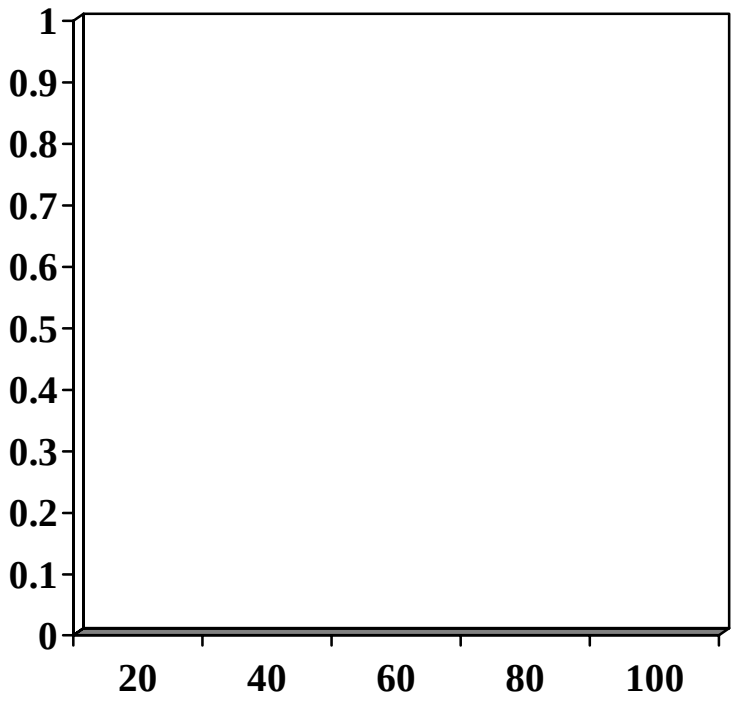
3d) Suggest one molecular chaperonin (also known as accessory protein) which can facilitate refolding of YFP. You must provide an explanation for your answer. (6 pts)

4a) Describe the secondary, tertiary and quaternary structure of hemoglobin. (10 pts)

4b) Identify the prosthetic group that is found within hemoglobin. Describe this molecule's physiological function and its structural features that are important for its function. (7 pts)

4c) What does it mean when we say the P_{50} of hemoglobin for binding to oxygen is 26 mmHg? (4 pts)

4d) Use the axes shown below to draw a binding curve for hemoglobin reversible binding to oxygen. Also include the P_{50} value indicated in part c on your binding curve. (Label the axes completely) (8 pts)



4e) What coefficient is used to measure cooperative interactions in proteins? Discuss the significance of this coefficient's value with regards to subunit interactions in proteins? (6 pts)