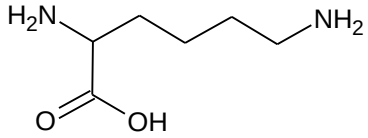
PRACTICE EXAM #4

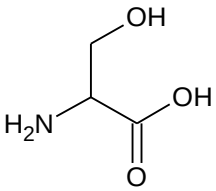
Chem21, Introduction to Organic and Biochemistry

Instructions: Don't panic. There are three (3) total pages for this exam. For every question, read all given directions and follow them completely. Clearly and logically show all your work and reasoning where applicable. Box all final answers.

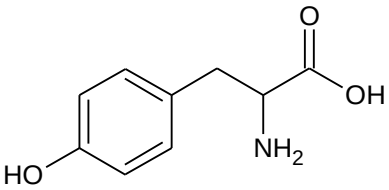
1.) Consider the structures of lysine, serine, and tyrosine below. (46 pts)



lysine



serine



tyrosine

a.) Circle only the amino acid backbone in each.

b.) Classify each as (1) acidic-polar, (2) basic-polar, (3) neutral-polar, or (4) nonpolar.

Lysine _____

Serine _____

Tyrosine _____

c.) For each pair of amino acids, identify which side chain interaction will predominate from (1) hydrogen bonding, (2) covalent bonds, (3) salt bridges, or (4) hydrophobic interactions.

Lysine + Serine _____

Tyrosine + Lysine _____

Serine + Tyrosine _____

d.) Draw the full structure of the **dipeptide** with the sequence Ser-Tyr.

e.) Clearly indicate the **C-terminus** and the **N-terminus** in the structure in (d).

f.) How many **amide** groups are in (d)? Circle them. _____

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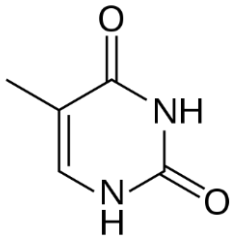
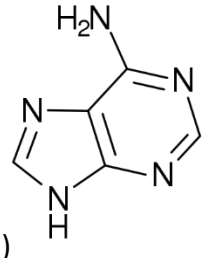
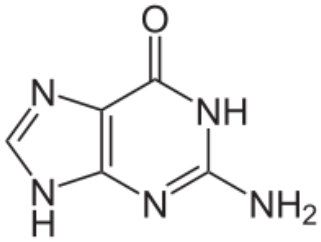
2.) List at least <u>two</u> structural differences between DNA and RNA. (10 pts, 5 pts ea)

3.) Identify the following nucleic acids as (1) adenine, (2) guanine, (3) cytosine, (4) thymine, or (5) uracil. (15 pts, 5 pts ea)

(a) 

(b) 

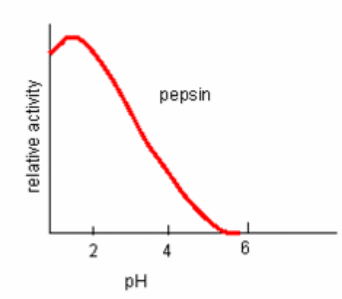
(c) 

a.) _____

b.) _____

c.) _____

4.) Consider the enzyme pepsin, whose activity was graphed against pH. (15 pts)

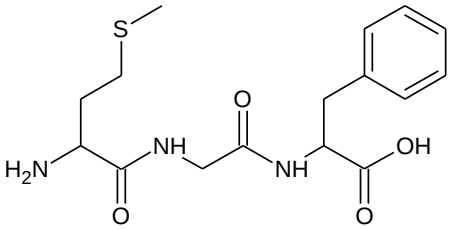


a.) Estimate the optimal pH. _____

b.) Would pepsin be active at pH > 6? _____

c.) Would increasing [substrate] *always* increase the activity of pepsin? Why or why not?

5.) Consider the following peptide with the primary structure Met-Gly-Phe. (23 pts)



a.) How many peptide bonds are present? _____

b.) How many amino acids will be formed after hydrolysis? _____

c.) Give the <u>full</u> names of all three amino acids.

Met: _____

Gly: _____

Phe: _____

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6.) Consider the following single DNA fragment. (20 pts)

3'-T A C G A C C T T A A G A T C G C T …

a.) Write the sequence for the *complimentary* DNA strand.

b.) Write the sequence for the product via *replication* of the leading strand.

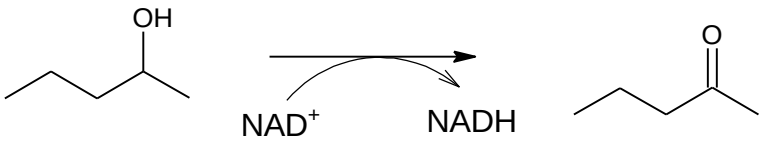
c.) Write the sequence for the product via *transcription* of the leading strand.

d.) Write the sequence for the product via *translation* of the mRNA.

7.) Give the two most common *secondary* structures of proteins. (10 pts, 5 pts ea)

8.) Define *essential* and *nonessential*, in terms of amino acids. (10 pts, 5 pts ea)

9.) Consider the following reaction. (16 pts)



a.) Is 2-pentanol being *oxidized* or *reduced*? _____

b.) Explain your answer in (a).

c.) Is NAD+ being *oxidized* or *reduced*? _____

d.) Explain your answer in (c).

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