ANSWER KEY Module 8 Dropbox Worksheet Assignment

Purpose: The purpose of this assignment is to help you prepare for the final exam by applying some of the concepts that will be included on it. This assignment will help to increase your familiarity of organic nomenclature, organic chemical reactions, carbohydrates, fatty acids, osmosis, protein interactions, and metabolic energy production.

Student Learning Outcomes addressed in this assignment:
After completing this worksheet, you will be able to:

- generate the name of organic molecules containing common organic functional groups.
- construct products of alkene addition, condensation, and hydrolysis reactions.
- identify structural components of carbohydrates.
- predict the effect of tonicity on red blood cells.
- generate the fatty acid carbon designation.
- predict the attractive forces that occur between amino acids.
- generate the product of transcription and translation during the protein synthesis process.
- calculate the number of energy molecules formed during the metabolism of fatty acids.

Assignment: Complete the following problems.

Criteria: This worksheet is worth 100 points. The maximum points possible for each problem is provided.

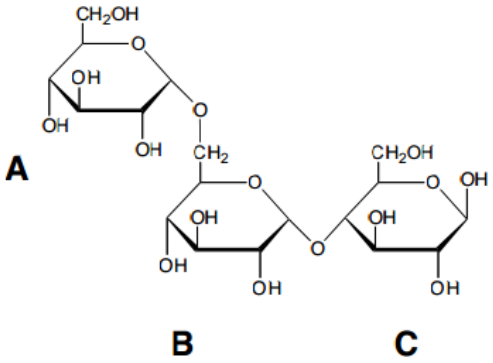
1. Panose is a trisaccharide that is being considered as a possible sweetener by the food industry.

   a) (3 pts ea.) Name the monosaccharides present in the molecule. Be sure to include α/β and D/L.

   molecule A **α-D-glucose**

   molecule B **α-D-glucose**

   molecule C **β-D-glucose**



   b) (3 pts ea.) Name the glycosidic bonds in the molecule.

   connects A and B **α(1→6)**

   connects B and C **α(1→4)**

   c) (2 pts) Is the structure drawn as α or β panose?
   This is β-panose based on the conformation of the glucose with the free anomeric carbon.

   d) (2 pts) Would panose be classified as a reducing sugar?
   Yes, it is a reducing sugar because it has a free anomeric carbon.

2. (4 pts ea.) Describe each of the following solutions as isotonic, hypotonic, or hypertonic. Indicate whether a red blood cell placed in each solution will undergo hemolysis, crenation, or no change.

   a) 5% (m/v) glucose solution **isotonic – no change**

   b) 0.2% (m/v) NaCl solution **hypotonic – hemolysis**

   c) 1.0% (m/v) glucose solution **hypotonic – hemolysis**

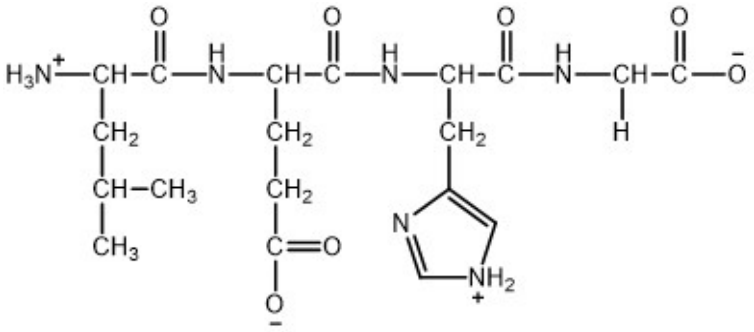
3. (2 pts ea.) What type of interaction (nonpolar, polar, salt bridge, disulfide bridge) would you expect between the R groups of the following amino acids in the tertiary structure of a protein?

   a) cysteine and cysteine **disulfide bridge (also accept disulfide bond)**

   b) aspartic acid and lysine **salt bridge (also accept ionic bond/attraction)**

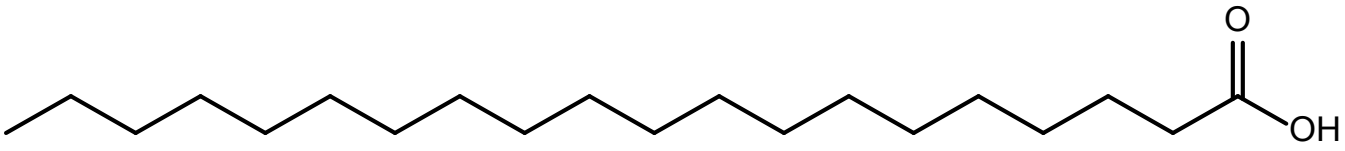
   c) leucine and isoleucine **nonpolar (also accept hydrophobic or dispersion forces)**

4. (4 pts) Name the following peptide using the one-letter abbreviation for each amino acid.



LEHG

5. (3 pts) Calculate the total number of ATP produced from the complete oxidation of the following fatty acid.

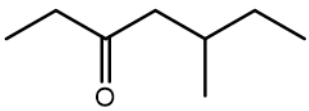


134 ATP

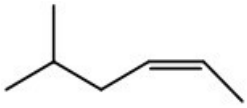
20 C

Fatty acid activation =	-2 ATP
9 turns of β-oxidation cycle (1 NADH and 1 $FADH_2$) =	9 x 4 ATP
10 acetyl-CoA in the citric acid cycle (3 NADH, 1 $FADH_2$, 1 GTP) =	10 x 10 ATP

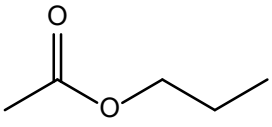
6. (4 pts ea.) Name the following molecules:

a) 

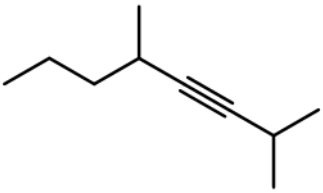
5-methyl-3-heptanone

b) 

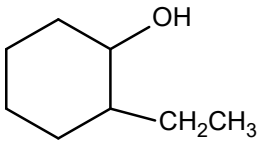
cis-5-methyl-2-hexene

c) 

propyl ethanoate

d) 

2,5-dimethyl-3-octyne

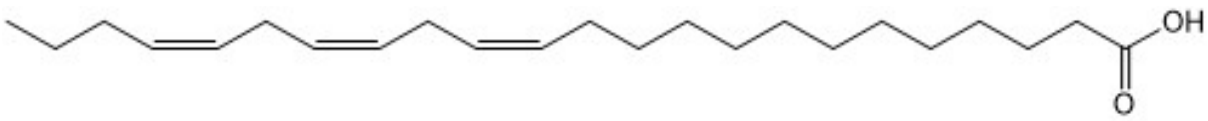
e) 

2-ethylcyclohexanol

7. (20 pts) Using the following piece of DNA, give the mRNA and amino acid sequences for which it codes.

DNA	A	T	A	T	G	A	T	C	T	T	A	T	C	T	A	A	A	C	C	G	A	T	C	G
mRNA	**U**	**A**	**U**	**A**	**C**	**U**	**A**	**G**	**A**	**A**	**U**	**A**	**G**	**A**	**U**	**U**	**U**	**G**	**G**	**C**	**U**	**A**	**G**	**C**
Amino Acids (3-letter)	**Tyr**			**Thr**			**Arg**			**Ile**			**Asp**			**Leu**			**Ala**			**Ser**		
Peptide name using 1-letter abbreviations										**YTRIDLAS**														

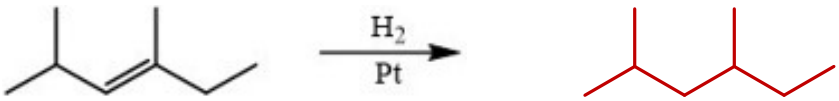
8. (4 pts) Provide the carbon designation of the following molecule using the omega and delta systems:



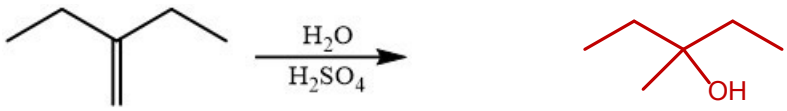
omega – [23,3], ω-4
delta – [23,3], $\Delta^{13,16,19}$

9. (4 pts ea) Draw the major organic product of the following reactions:

a)



b)



c)