Names: _____
Chem 227/ Dr. Rusay

Carbohydrates

1.

H
|
HO⸱⸱⸱⟋ ⟍CH₂OH
HC=O

(R)-(+)-glyceraldehyde

2.   Refer to: http://ep.llnl.gov/msds/orgchem/Chem227/naming.html
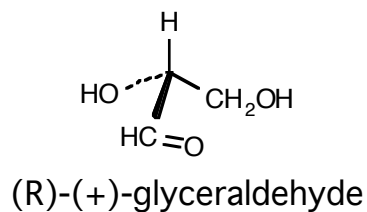
   a. Draw a Fischer projection formula or Haworth formula for each of the six compounds.
   b. Name each carbohydrate: detailed generic or precise names accepted. Clearly identify any that
      are not "carbohydrates".
   c. For each of the models that are carbohydrates, indicate if it is a mono-, di-, or polysaccharide
      and if it is a reducing or a non-reducing sugar.

Name: [mono- / di- / poly-] [reduce / non]	Name: [mono- / di- / poly-] [reduce / non]	Name: [mono- / di- / poly-] [reduce / non]
Name: [mono- / di- / poly-] [reduce / non]	Name: [mono- / di- / poly-] [reduce / non]	Name: [mono- / di- / poly-] [reduce / non]

3. Provide Fisher structures:

a.	b.	c.

4. Provide structures for the major organic products:

a.	b.	c.

d.	e.

5. Give structures **A** through **E**.

A.	B.	C.

D.	E.

6. Complete the Wordsearch. Fill-ins for the blanks can be turned in on a separate page.

Sugar Wordsearch

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This puzzle contains 29 names, terms, prefixes, and acronyms that describe sugars and their polymers. Find and highlight these terms in the matrix below. "CARBOHYDRATE" is already done for you. Then, correctly transfer them to the blanks in the description below the matrix. Use the letters remaining in the matrix to complete the sentence describing these molecules. Your success will be rewarded. The answers to the Sugar Wordsearch are found below. Good hunting!

```
N I E T O R P O C Y L G S U
N I T I H C G L U C O S E G
K E T O S E S S E S O D L A
E A G C H E X O S E I P E R
S S L S E S O B I R A Y S S
O U Y T M P A M A M K R O N
T G C A R B O H Y D R A T E
C A O R E N C L L I F N C G
A R L C O C O E Y S W O U O
L N I H A S E L P M I S R C
A A P S E R E M O N A E F Y
G N I C U D E R E T S E E L
E D D C E L L U L O S E T G
```

CARBOHYDRATEs can be S_____ S____s that are either A_____ or K_____ and are therefore R_____ sugars. Table sugar, S_____, is a D_____ of the H_____s F_____ and G_____ in cyclic furanose and P_____ forms, respectively. L_____ is glucose linked to G_____. Plants store energy in the ____saccharide S_____, which contains A_____ and A_____. The animal equivalent is G_____. The only ____mer in them is the alpha A_____ of glucose. Beta-linked glucose or N-acetylglucosamine makes C_____ or C_____, respectively. Both are structural polymers. Complex molecules like G_____s and _____P_____s have sugars attached. Finally, phosphodi_____ bonds link R_____ units in the backbone of ___. Converting the pentose into the deoxy form produces a ___ strand.

Use the remaining letters to fill in the following sentence: _ _ _ _ _   _ _ _ _   _ _ _ _   _ _ _ _ _ .

7. Refer to: http://ep.llnl.gov/msds/orgchem/Chem227/naming.html

II.a)

b)

c) How many glucose molecules could be contained within: i) the space of a virus and ii) the space of a red blood cell?

($V = 4.189 \, r^3$) Show your respective calculations.