Homework 1 Key (Stowell)

1) (15pts) Molecules are held together by a variety of chemical bonds/forces listed below. An answer can be used once, multiple times or not at all.:

   A. Covalent bonds
   B. Hydrogen bonds (Dipole-Dipole)
   C. Ionic bonds
   D. Van der Waals forces or bonds (e.g. Induced Dipole/Induced Dipole)

   Match these bonds with the appropriate description given below

   Weak bonds between polar molecules. __**B,C**___
   Bonds formed between positive and negative charged atoms. __**C**___
   Bonds important in biology because they allow flexibility. __**ABCD**___
   Bonds formed through the sharing of electrons to form "full" orbits. ___**A**__
   The strongest bonds of the four are. __**A**____
   Order these types of interactions based on strength.

   A>B>C>D

2) Match the chemical descriptions below with the types of biological molecules. An answer can be used once, multiple times or not at all.

   A. Polysaccharides
   B. Nucleic acids
   C. Proteins
   D. Lipids
   E. Phospholipids

   Biological polymers composed of chains of amino acids. ___**C**____.
   Biological polymers composed of sugar, bases, and phosphate. ___**B**___.
   Biological polymers made of sugar subunits. ___**A**____.
   Biological polymers formed with peptide bonds. ____**C**___.

3) A DNA molecule does NOT contain the following:

   A. Uracil
   B. Cytosine
   C. Adenine
   D. Thymine
   E. Ribose

OVER=====➔

4) A RNA molecule does NOT contain the following:
   A. Cytosine
   B. Adenine
   C. Thymine
   D. Ribose
   E. Deoxyribose

C. Thymine

5) There are ~$3x10^9$ base pairs of DNA in a single human cell. How long is this in meters?

$3x10^9 x 0.34x10^{-9}$M = 1.02 M

6) Knowing that the rate of a chemical reaction is dependent on the concentration of the reactants, explain why RNA is less stable than DNA.

The 2' hydroxyl serves as a local nucleophile and enhances the rate of phosphate hydrolysis.