Biophysical Chemistry for Life Scientists

Biotechnology Research Center, National Taiwan University
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Instructor: Sunney I. Chan
Vice President & Distinguished Research Fellow
Institute of Chemistry, Academia Sinica
Telephone: 2-2789-9402
E-mail: chans@chem.sinica.edu.tw

Problem Set 1
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(1) Look up anywhere, web-site, journal articles, textbooks, and reproduce the DNA double helix.
   a. Is the helix of each strand right-handed or left-handed?
   b. What is the pitch of the helix?
   c. Identify the major and minor grooves of the DNA.
   d. Sketch the Watson-Crick A-T and G-C basepairs and identify the hydrogen-bonds.
   e. What is the approximate distance between the adjacent stacked basepairs?

(2) Repeat (1) for an alpha-helix of a polypeptide.
   a. What is the pitch of the helix?
   b. Identify the hydrogen-bonds that are important for

stabilizing the alpha-helix.

(3) Repeat (2) for an anti-parallel beta-sheet of a polypeptide.
   a. Identify the hydrogen-bonds that are important for stabilizing the beta-sheet structure.
   b. What is the approximate distance between adjacent hydrogen-bond in the structure.
   c. Turns are often crucial in the nucleation and formation of beta-sheet structures. Why? Of the 20 odd amino acids, which residues do you think are most likely to promote turns?