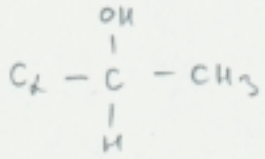
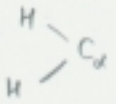
Problem 3. (30 pts total, 6 points each)
In a protein, the following pairs of amino acids happen to be close in space and, therefore, their side chains could potentially interact with each other. Draw the complete structure of the side chains (R-groups) of these amino acids. Indicate what type of interaction is possible between the side chains (if there is no interaction, clearly say that) at pH=7.0. Indicate clearly the charged groups of these amino at this pH. In the case of hydrogen bonding, draw a dotted line to indicate the hydrogen bond and clearly label the donor and acceptor in each hydrogen bond.

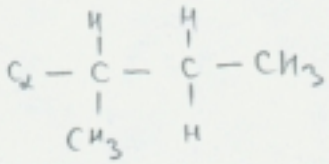
(1) thr – gly

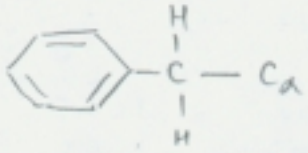




no interaction

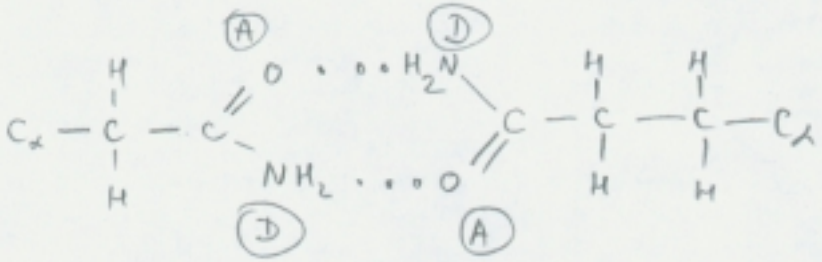
(2) ile – phe





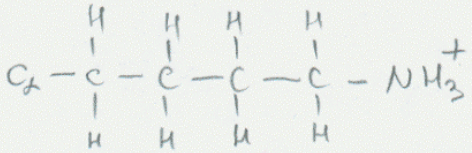
hydrophobic interaction

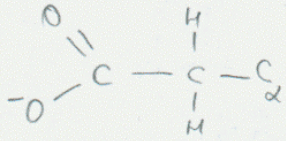
(3) asn -- gln



H-bonds

(4) lys – asp





ionic interaction (electrostatic attraction)