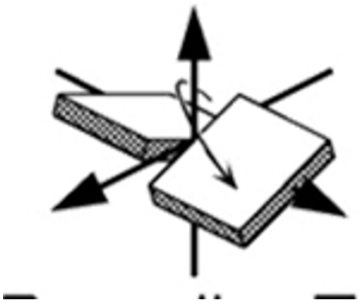
A – The figure on the right shows a base pair in a double helical structure with each base represented by a square.
On the picture on the left, write the names of the 3 straight axes drawn – 1.5pt



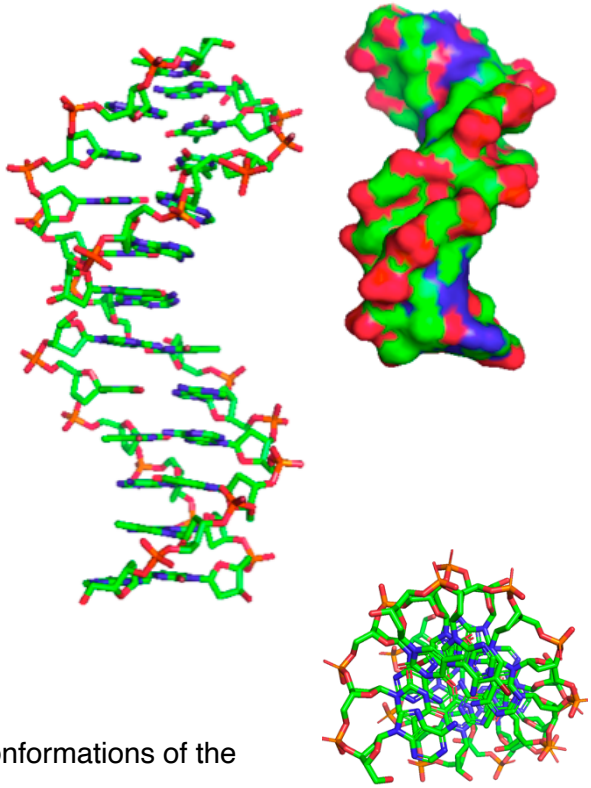
B- What geometrical parameter of the base pair does this picture illustrate? 1pt.

C – Near each picture write the name of the geometrical parameter of the helix or base pairs that the following pictures represent – 2pts.

D – Which geometrical parameter of the double helix studied in class is not represented in any of the previous three pictures? 1pt.

Question 2 – 10pts.

A double stranded nucleic acid made exclusively of alternating A-T base pairs:
5′ATATAT..-3′
3′TATATA..-5′ is shown on the right. The pictures on the top show the overall structure in sticks or space filling (carbons in green). The picture at the bottom shows the details of two consecutive base pairs. The other base pairs in the structure are similar to the one shown below.

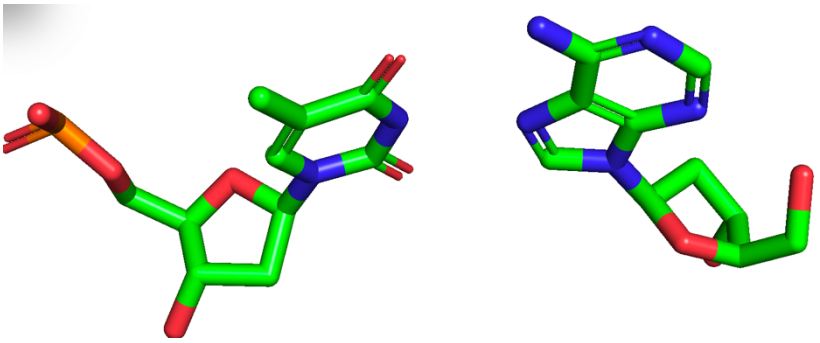


A- Based on the overall structures shown on the pictures at the top, identify what helical conformation this structure most closely resembles (A-form, B-form, or Z-form). Explain your answer based on three features that can be seen on the pictures – 3pts

B –Indicate on the figure at the bottom the glycosidic bond conformations of the nucleotides shown– 2 pts.

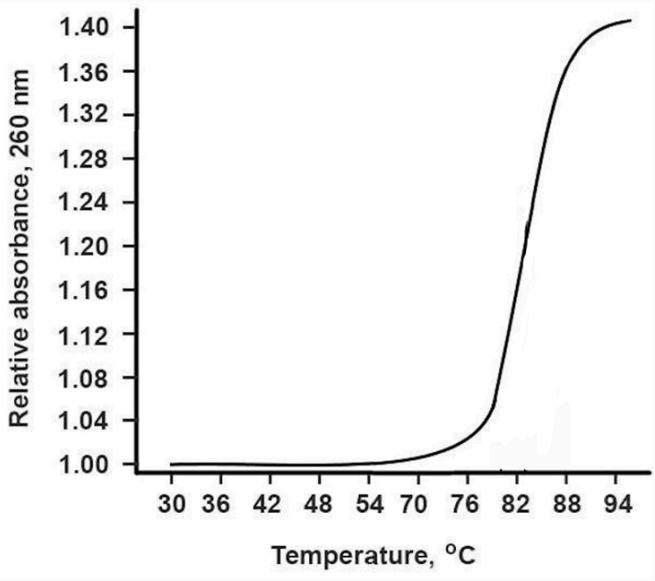
C – Draw on the figure at the bottom the interactions between the two bases; add hydrogen atoms if H-bonds are involved, and label the atoms involved using the base numbering system – 2pts.

D -Explain what type of interaction is typically observed between bases in the classical helical conformation that this structure (above) most closely resembles (A-form, B-form, or Z-form), and describe how the interaction shown here differs. – 3pts.



This picture shows the relative UV 260nm absorbance of a DNA molecule as a function of temperature. The measurement is performed in a solution containing 50 mM Na^+.

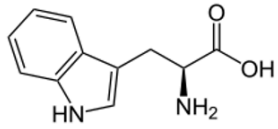
A – Based on this curve, indicate the approximate Tm of this DNA molecule – 2pts



B – What would you expect would happen to the Tm if the same experiment were to be performed in a solution containing 200mM Na^+ instead of 50mM Na^+ ? 2pts

C- The pictures below show the structures of the amino acids Tryptophan (TRP) and Lysine (LYS).
On the graph draw approximately the two denaturation expected curves if the same experiment were to be performed in a solution containing 50mM and a large amount of TRP or LYS in the solution. Label the curves with “TRP” and “LYS”
Explain your reasoning using 1-2 sentences max for each condition. 4pts.

TRP



LYS