Consider the attached FRET efficiency data for double-stranded DNA in solution with the FRET donor attached to the nucleotide pair on one terminus of the DNA and the FRET acceptor attached to the nucleotide pair on the other end of the DNA. The horizontal axes correspond to the numbers of nucleotide pairs in the DNA and the vertical axes are the FRET efficiencies. For this particular FRET pair, $R_0 = 45 \text{ Å}$.

(a) (10 points) Use the plot to calculate the experimental ratio FRET efficiency (14 nucleotide pairs)/FRET efficiency (10 nucleotide pairs).

(b) (20 points) Consider a linear polymer structural model for DNA where there is 3.4 Å separation between nucleotides and 13 Å donor/acceptor separation if both donor and acceptor were attached to the same nucleotide pair. For this model, calculate FRET efficiency (14 nucleotide pairs)/FRET efficiency (10 nucleotide pairs).

(c) (20 points) For the b model, make a semi-quantitative plot of the expected variation of the FRET efficiency between $R = R_0$ and $R = 2R_0$. Compare the shape of this plot to the experimental data.

(d) (20 points) Use your a,b,c results to assess whether or not the linear polymer structural model of DNA is supported by the experimental data.

(e) (20 points) Make a drawing of a reasonable alternative structural model for DNA. Describe whether any periodicity in the FRET experimental data is quantitatively consistent with any periodicity expected from this structural model.