Final Modeling

1. It is a commonplace belief that the thumbprint of every human who has ever lived is different. Develop and analyze a model that will allow you to assess the probability that this is true. Compare the odds (that you found in this problem) of misidentification by fingerprint evidence against the odds of misidentification by DNA evidence.

2. Complex chemicals often have flexibility that can lead them to fold in interesting ways. For example, proteins have a "backbone" that connects lots of amino acids together. Many of the angles connecting chemicals in the "backbone" together are quite fixed, but since we are in $\mathbb{R}^3$ many chemicals still have the freedom to "spin" which can allow the protein to fold back in on itself. If given a protein configuration find a reasonable bound for what the length of this backbone would be if it was stretched out (but still maintaining the angles!) as far as it could be. Also find a reasonable bound for what the length of this backbone would be if it was as curled up as possible.