1. How many total possible outcomes (ex. HTHHTT.., HHTTTT…) can be achieved if you flip N coins? Hint: Every coin has two possibilities. Try drawing a tree where each branch depicts a possible outcome for one coin—do you see a pattern?

1. Compute the following:
   * 2!
   * 5!
   * 100!/99! (Hint: this should be a fast calculation)

1. Suppose you have P people lined up and you want to interrupt the line with B barriers, (so as to divide the people into groups). In how many ways can you arrange these barriers ? An example of one two such arrangements are shown below for P=10 people (\*) and B=4 barriers (vertical bars |).  
     
   \*\*|\*\*\*|\*\*|\*\*|\*  
   \*|\*\*\*\*|\*\*|\*|\*\*

1. Suppose an unfolded protein has energy E, while the folded state has energy 0. Further suppose that the unfolded protein can occupy 2N states. Solve for the temperature T at which the protein will be folded with 50% probability as a function of E, N, and the Boltzmann constant *kB*. At this temperature, the protein is said to *denature*, or lose its structure