

Collaboration is permitted; looking for solutions from external sources (books, the web, etc.) is prohibited.

1. How many bits does 10^{80} have if written in base 2?
2. How many different 5-letter strings can you get by rearranging the letters of the word DAVIS? How many different 10-letter strings can you get by rearranging the letters of the word CALIFORNIA?
3. 19 persons are sitting around a table. In how many ways can we choose 3 persons, no two of whom are neighbors?
4. What is the number of ways to color n objects with 2 colors? What is the number of ways to color n objects with 3 colors? What is the number of ways to color n objects with 3 colors if every color must be used at least once?
5. Prove by induction that $11^n - 6$ is divisible by 5 for every positive integer n .