

Homework 4

1. (5 points) In how many ways can we distribute 8 identical tennis balls into 4 distinct baskets (labeled 1-4) so that no basket is empty and the 4th basket has an odd number of balls in it?
2. (5 points) Determine the coefficient of $x^9y^3z^7$ in $(2x - 3y + 4z)^{19}$.
3. (5 points) Find the number of permutations of the letters in MISSISSIPPI so that none of the Is are consecutive.
4. (5 points) In Professor X's history class, the students will do a project where each group presents on the development of mathematics on one of the 6 continents with long-term human inhabitants (sorry, Antarctica). There are 27 students enrolled in the class, and they need to split into groups so that 4 students report on each of North America, South America, and Australia, and 5 students on each of Asia, Europe, and Africa.

Since this is a big project, Professor X will assign one of his 6 graduate assistants to consult with each group. However, he needs to assign them to groups carefully: Ang grew up in Asia so assigning her to help that group would be an unfair advantage. Also, Christopher is falling behind in his studies on North America so Professor X would like to help him catch up by assigning him to that group. The other 4 grad assistants may be assigned to any of the 6 groups.

In how many ways can Professor X assign his students and graduate assistants to groups so that each continent has the correct number of students reporting on it, Christopher is assigned to North America, and Ang is not assigned to Asia?

This is a complicated problem- take your time and read carefully! You may, as always, assume the people are distinct.