Discrete Mathematics Homework 3

1. Professor Ruth has five graders to correct programs in her courses in Java, C++, SQL, Perl, and VHDL. Graders Jeanne and Charles both dislike SQL, Sandra wants to avoid C++ and VHDL. Paul detests Java and C++, and Todd refuses to work in SQL and Perl. In how many ways can Professor Ruth assign each grader to correct programs in one language, cover all five languages, and keep everyone content?

2. Using generating function to find the number of solutions of $x_1 + x_2 + x_3 = 9$ where x_1, x_2, x_3 are integers with $0 \le x_1 \le x_2 \le x_3$. Lists all the possible distributions.

3. A computer dating service wants to match each of four women with one of six men. According to the information these applicants provided when they joined the service, we can draw the following conclusions.

 · Woman 1 would not be compatible with man 1, 3, or 6.

 · Woman 2 would not be compatible with man 2 or 4.

 · Woman 3 would not be compatible with man 3 or 6.

 · Woman 4 would not be compatible with man 4 or 5.

In how many ways can the service successfully match each of the four women with a compatible partner?

4. In how many ways can Traci select n marbles from a large supply of blue, red, and yellow marbles (all of the same size) if the selection must include an even number of blue ones?

5.   How can Mary split up 12 hamburgers and 16 hot dogs among her sons Richard, Peter, Christopher, and James in such a way that James gets at least one hamburger and three hot dogs, and each of his brothers gets at least two hamburgers but at most five hot dogs?