CS1231 TUTORIAL 10

1. Determine the number of integers between 1 and 2019 inclusive, which are multiples of 6 or 7 or 9 but not multiples of 12.

2. What is the probability that a die never comes up an even number when it is rolled six times?

3. Find the coefficient of a^5b^7 in the expansion of $(a-2b)^{12}$.

4. Find the coefficient of $a^5b^2c^8$ in the expansion of $(a+b+c)^{15}$.

5. Express each of the following in close form, i.e., in a single expression.

$$\sum_{i=0}^{n}\binom{n}{i}4^i; \qquad \sum_{k=0}^{n}(-1)^k\binom{n}{k}3^{2n-2k}2^{2k}.$$

6. There are 7 students $a_1, \ldots, a_7$ in a graph theory class. Students are told to divide themselves into several groups for project work with unrestricted group size. The following pairs of students cannot work together:

$$(a_1,a_2),(a_1,a_3),(a_2,a_3),(a_2,a_6),(a_3,a_6),(a_4,a_6),(a_4,a_7),(a_5,a_6),(a_5,a_7).$$

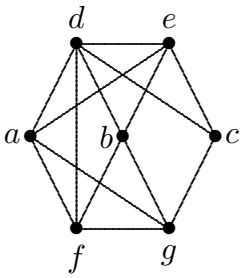
Describe a graph G that models these relations between the students. Use G to find the **minimum** number of groups needed so that any of the above pair of students are not in the same group.

7. In the following graph: (i) Find a simple circuit of length 8

(ii) Find the largest value of n such that C_n is a subgraph.

(iii) Find all the neightbours of b.

(iv) Find two different paths of length 3 from c to e.



8. Either draw the graph with the specified properties or explain why such a graph does not exists:

(i) 4 vertices, degrees 1, 1, 1 and 4. (ii) 4 vertices, degrees 1, 2, 3 and 4.

9. Let G be a graph with 50 edges, 9 vertices of degree 2, 10 vertices of degree 6. The degrees of the other vertices are either 3 or 5. How many vertices does the graph have?