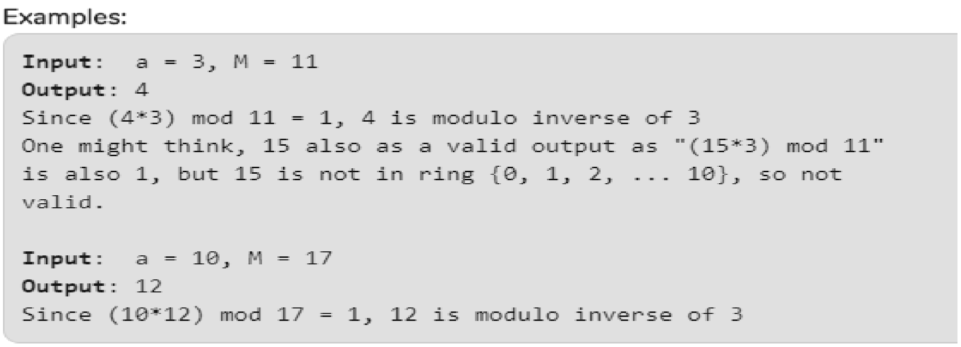
Mathematics -2

1. LCM & GCD
    a. https://www.geeksforgeeks.org/program-to-find-lcm-of-two-numbers/
    b. https://www.geeksforgeeks.org/steins-algorithm-for-finding-gcd/
2. Permutation & Combination
    a. https://www.geeksforgeeks.org/permutation-and-combination/
    b. https://www.tutorialspoint.com/permutation-and-combination-in-java
3. Modular Arithmetic
    a. Formulae:-
        i. (a + b) mod M = ((a mod M) + (b mod M)) mod M.
        ii. (a - b) mod M = ((a mod M) - (b mod M)) mod M.
        iii. (a * b) mod M = ((a mod M) * (b mod M)) mod M.
    b. https://www.hackerearth.com/practice/math/number-theory/basic-number-theory-1/tutorial/
    c. https://www.geeksforgeeks.org/modular-arithmetic/#:~:text=Modular%20Arithmetic,multiplication%2C%20division%20or%20any%20other.
    d. The above three expressions are valid and can be performed as stated. But when it comes to modular division, there are some limitations.
       There isn't any formula to calculate: (a / b) mod M , Hence we have Modular Inverse.
4. Modular Inverse
    a. The modular inverse is an integer 'x' such that.
        i. a x ≡ 1 (mod M)
    b. The value of x should be in {0, 1, 2, ... M-1}, i.e., in the ring of integer modulo M.
    c. The multiplicative inverse of "a modulo M" exists if and only if a and M are relatively prime (i.e., if gcd(a, M) = 1).



Examples:

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Input:  a = 3, M = 11
Output: 4
Since (4*3) mod 11 = 1, 4 is modulo inverse of 3
One might think, 15 also as a valid output as "(15*3) mod 11"
is also 1, but 15 is not in ring {0, 1, 2, ... 10}, so not
valid.

Input:  a = 10, M = 17
Output: 12
Since (10*12) mod 17 = 1, 12 is modulo inverse of 3
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d. Euclidean algorithms : -https://www.geeksforgeeks.org/euclidean-algorithms-basic-and-extended/

e. Fermat Little Theorem :- https://www.geeksforgeeks.org/fermats-little-theorem/

Sample Problems to Solve:-

1. https://www.codechef.com/problems/FLOW016
2. https://www.hackerrank.com/challenges/picking-cards/problem
3. https://www.codechef.com/problems/IITK2P10