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ĐẠI HỌC BÁCH KHOA HÀ NỘI

HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

ONE LOVE. ONE FUTURE.

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Applied Algorithm Lab

Count #solutions to an integer linear equation

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Count #solutions to an integer linear equation

- Compute the number of solution to an integer linear solution
- **Input:** 2 positive integers n, M

  n positive integers $a_1, a_2, \ldots, a_n$.
- **Output:** Number of positive integer solution to the equation

$$a_1X_1 + a_2X_2 + \ldots + a_nX_n = M$$

Count #solutions to an integer linear equation

- Example

stdin	stdout
3 5 1 1 1	6 Explain: (1,1,3), (1,2,2), (1,3,1), (2,1,2), (2,2,1), (3,1,1)

Count #solutions to an integer linear equation

- Idea to solve: Apply backtracking search to explore solutions that satisfy the given constraints.
  - Consider the variables in the order: $X_1, X_2, \dots, X_{k-1}, X_k, X_{k+1}, \dots, X_n$.
  - Suppose values have been assigned to $X_1, X_2, \dots, X_{k-1}$, consider X_k.
  - **Branch and bound:** X_k takes values within range

$$1,2,\dots,\frac{M-(a_1X_1+a_2X_2+\cdots+a_{k-1}X_{k-1})-(a_{k+1}+a_{k+2}+\cdots+a_n)}{a_k}$$

  - programming …

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THANK YOU !