



HUST

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, \dots, a_n .
- **Output:** Number of positive integer solution to the equation

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

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

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

- programming ...

A large graphic on the left side of the slide. It features a dark blue background with a circular pattern of red dots of varying sizes, creating a sense of depth and movement. The word "HUST" is centered within this graphic in a white, bold, sans-serif font.

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THANK YOU !