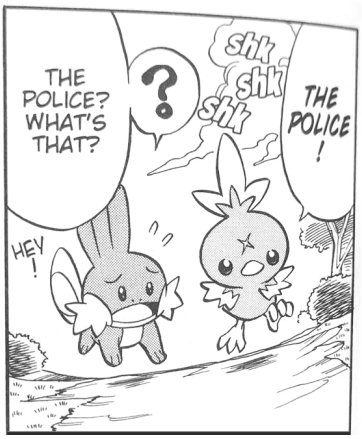
Problem 11: Pokémon-MD5
7+3=10 Points

Problem ID: `rescueteam`
Rank: `3+3`

Introduction



You got "transported" into the world of Pokémon—now you must go through a mystery dungeon to seek your fortune. However, because we ran the deterministic MD5 algorithm (instead of a random number generator) to generate our dungeon, each floor has an identical layout. You originally wanted to explore every floor, but forgot to bring apples, so you'll have to make do with the current energy stored in your belly. Each step depletes your belly, and you will fall asleep for a very long time if it reaches zero; you'll need to plan ahead to make it out in time!

Problem Statement

There is a dungeon with $\mathbf{F}$ floors, each with the **same layout** of $\mathbf{N}$ rooms (numbered 1 to $\mathbf{N}$) and $\mathbf{M}$ bidirectional hallways. It's guaranteed to be possible to get from any room to any other room within a floor through some sequence of hallways. Every floor has the **same starting room**—the room numbered $\mathbf{S}$, and the **same exit room**—the room numbered $\mathbf{E}$. There is also a single treasure room on every floor; the i^{th} floor has treasure in the room numbered $\mathbf{R}_i$. Floors may have **different treasure room numbers**.

Begin at the starting room on floor 1. You can travel between rooms with connecting hallways. When at an exit room, you **have 3 options**: exit the dungeon, go to the starting room of the next floor (increasing the floor number by 1), or move to an adjacent room on the same floor.

You begin with a belly value of $\mathbf{B}$. This decreases by 1 whenever you travel through a hallway. **Belly does not decrease when going to the next floor or exiting the dungeon**. You must exit the dungeon (at any exit room) by the time your belly reaches 0. Find the maximum number of treasures you can collect with an initial belly capacity of $\mathbf{B}$.

Input Format

The first line of the input contains a single integer $\mathbf{T}$ denoting the number of test cases that follow. For each test case:

- The first line contains two space-separated integers $\mathbf{F}$ $\mathbf{B}$, where:
  - $\mathbf{F}$ denotes the number of floors in the mystery dungeon.
  - $\mathbf{B}$ denotes your initial belly value.
- The second line contains four space-separated integers $\mathbf{N}$ $\mathbf{M}$ $\mathbf{S}$ $\mathbf{E}$, where:
  - $\mathbf{N}$ denotes the number of rooms in each floor of the dungeon.
  - $\mathbf{M}$ denotes the number of hallways in each floor of the dungeon.
  - $\mathbf{S}$ denotes the room number of the starting room for each floor.
  - $\mathbf{E}$ denotes the room number of the exit room for each floor.
- The third line contains $\mathbf{F}$ space-separated integers $\mathbf{R_1}$ $\mathbf{R_2}$ … $\mathbf{R_F}$, denoting that the treasure on the i^{th} floor is located at room $\mathbf{R_i}$.
- For each of the next $\mathbf{M}$ lines, the i^{th} line contains two space-separated integers $\mathbf{U_i}$ $\mathbf{V_i}$, denoting that a hallway connects rooms $\mathbf{U_i}$ and $\mathbf{V_i}$ in each floor of the dungeon.

Output Format

For each test case, output a single line containing the largest value of treasure you can collect.

Constraints

$1 \le \mathbf{T} \le 100$
$3 \le \mathbf{N}, \mathbf{M} \le 10^5$
$\mathbf{S} \ne \mathbf{E}$
$\mathbf{R_i} \ne \mathbf{S}$ and $\mathbf{R_i} \ne \mathbf{E}$ for all i
$\mathbf{U_i} \ne \mathbf{V_i}$ for all i
The sum of $\mathbf{N}$ across all test cases in a test file does not exceed 10^5.
The sum of $\mathbf{M}$ across all test cases in a test file does not exceed 10^5.
There is at most one hallway between rooms.
It's guaranteed to be possible to get from any room to any other room through some sequence of hallways.

Main Test Set

$1 \le \mathbf{F} \le 100$
$1 \le \mathbf{B} \le 10^3$
The sum of $\mathbf{F}$ across all test cases in a test file does not exceed 100.
The sum of $\mathbf{B}$ across all test cases in a test file does not exceed 10^3.

Bonus Test Set

$1 \le \mathbf{F} \le 10^5$
$1 \le \mathbf{B} \le 10^9$
The sum of $\mathbf{F}$ across all test cases in a test file does not exceed 10^5.

Sample Test Cases

Sample Input Download

```
5
3 6
5 5 3 4
1 2 5
2 4
4 1
1 5
1 3
5 3
3 12
3 3 3 1
2 2 2
3 2
3 1
2 1
4 7
6 8 2 6
5 1 3 4
3 5
3 1
1 5
6 1
1 4
4 2
4 6
2 6
4 8
5 6 1 3
4 2 2 5
4 3
4 2
2 3
2 5
5 3
5 1
1 3
6 5 2 4
5
1 6
5 1
1 4
3 5
2 3
```

Sample Output Download

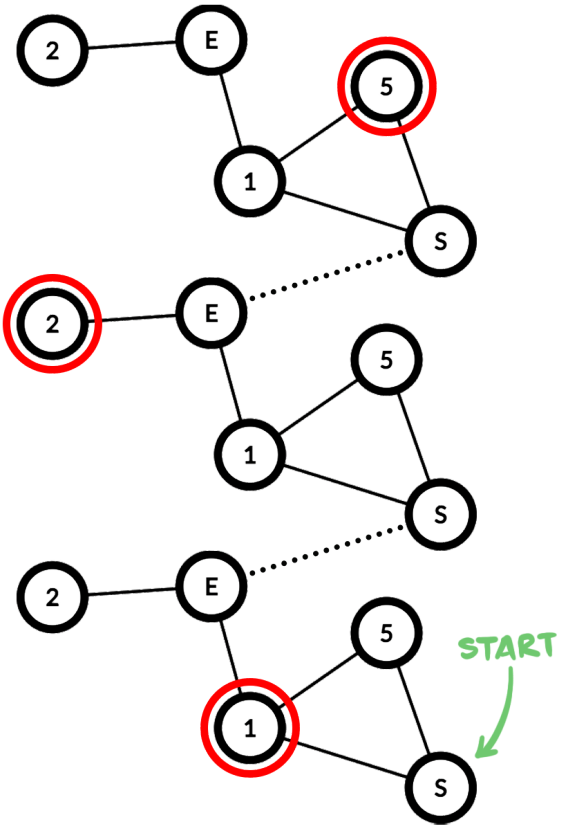
```
2
3
2
2
0
```

Sample Explanations

For each test case, the starting and exit rooms have been labeled **S** and **E**, and rooms with treasure are circled in red. Floor 1 is shown at the bottom and floor **F** is shown at the top.

Test Case #1:

The dungeon looks like this (labels 3 and 4 are replaced by S and E, respectively):



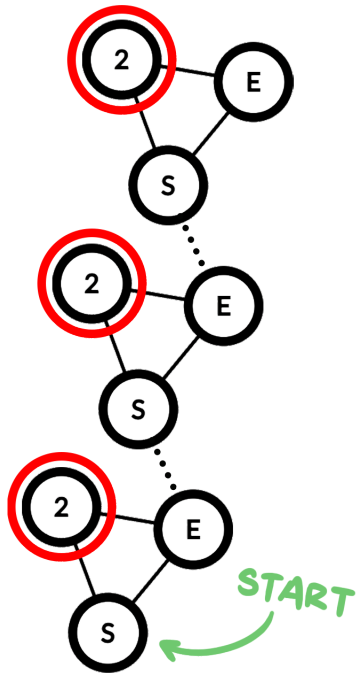
With **B** = 6 belly, you can collect a maximum of 2 treasures with the following steps:

1. **S** → 1: claim this floor's treasure
2. 1 → **E**: go to the next floor's **S**
3. **S** → 1
4. 1 → **E**
5. **E** → 2: claim this floor's treasure
6. 2 → **E**: exit dungeon

Following these steps, you exit the dungeon with 0 remaining belly. Note that we only explore the first two floors of the dungeon.

Test Case #2:

The dungeon looks like this (labels 3 and 1 are replaced by S and E, respectively):



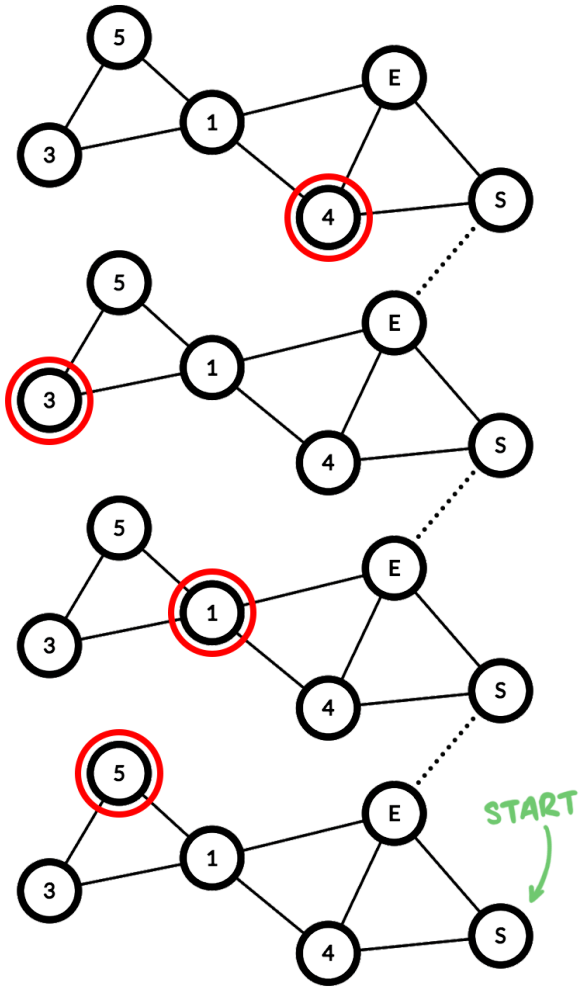
With **B** = 12 belly, you can collect a maximum of 3 treasures with the following steps:

1. **S** → 2: claim this floor's treasure
2. 2 → **E**: go to the next floor's **S**
3. **S** → 2: claim this floor's treasure
4. 2 → **E**: go to the next floor's **S**
5. **S** → 2: claim this floor's treasure
6. 2 → **E**: exit dungeon

Following these steps, you exit the dungeon with 6 remaining belly. Note that there are multiple ways to collect 3 treasures.

Test Case #3:

The dungeon looks like this (labels 2 and 6 are replaced by S and E, respectively):



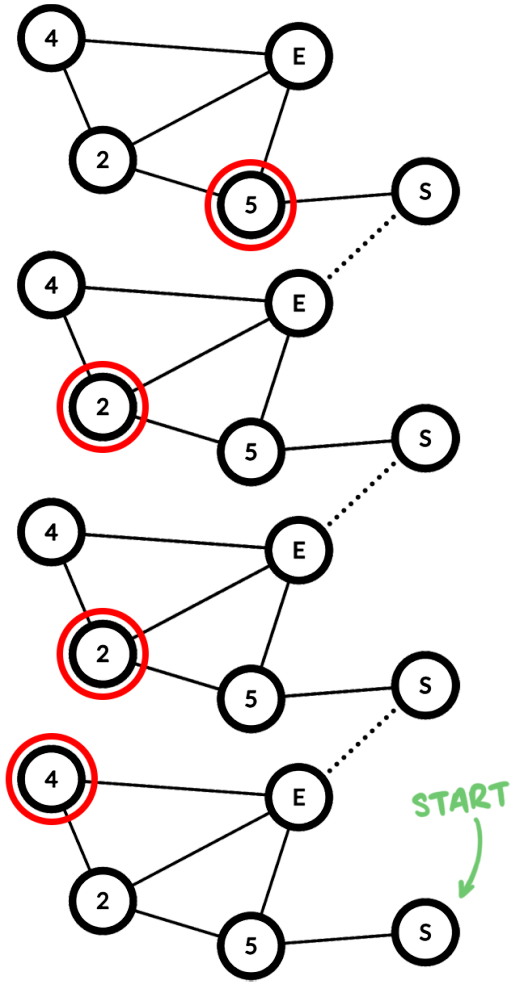
With $\mathbf{B}$ = 7 belly, you can collect a maximum 2 treasures exploring all 4 floors:

1. $\mathbf{S} \rightarrow \mathbf{E}$ (go to next floor)
2. $\mathbf{S} \rightarrow 4 \rightarrow \mathbf{R_2} = 1 \rightarrow \mathbf{E}$ (go to next floor)
3. $\mathbf{S} \rightarrow \mathbf{E}$ (go to next floor)
4. $\mathbf{S} \rightarrow \mathbf{R_4} = 4 \rightarrow \mathbf{E}$ (exit, 0 belly left)

Note that there are multiple ways to collect a treasure value of 2.

Test Case #4:

The dungeon looks like this (labels 1 and 3 are replaced by S and E, respectively):



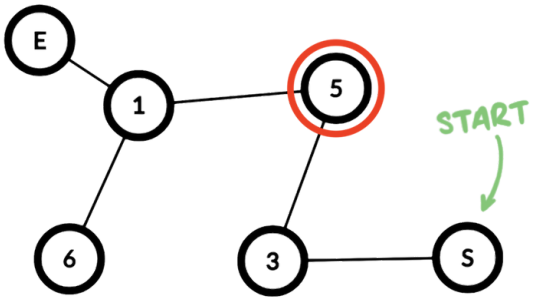
With $\mathbf{B}$ = 8 belly, you can collect a maximum of 2 treasures exploring the first 3 floors:

1. $\mathbf{S} \rightarrow 5 \rightarrow \mathbf{E}$ (go to next floor)
2. $\mathbf{S} \rightarrow 5 \rightarrow \mathbf{R_2} = 2 \rightarrow \mathbf{E}$ (go to next floor)
3. $\mathbf{S} \rightarrow 5 \rightarrow \mathbf{R_3} = 2 \rightarrow \mathbf{E}$ (exit, 0 belly left)

Note that there are multiple ways to collect a treasure value of 2, including ones that use only 7 belly and/or only explore the first two floors.

Test Case #5:

The dungeon looks like this (labels 2 and 4 are replaced by S and E, respectively):



Note that the dungeon only has 1 floor. However, with B = 3 belly, it's impossible to collect the treasure and exit the dungeon before your belly reaches zero, so the maximum value of treasure you can collect is zero.

orz

第 11 题：宝可梦-MD5

7+3=10 分

问题标识符: `rescueteam`
难度等级: 3+3

问题背景

你刚刚被吸入了宝可梦世界——现在你必须穿过一个神秘地牢寻找你的宝藏。但是由于地宫是通过确定性的MD5算法（而非随机数字生成器）生成，每一层都有相同的布局。你原本想要探索每一层楼，但忘了带食物，所以就只能靠肚子里现存的能量来行动。每一步行动都会消耗储存的能量，如果能量条归零，你就会进入长时间的休眠；为了及时完成任务，你需要提前做出规划！

问题描述

地牢共有 **F** 层，每层含 **N** 个**布局相同**的房间（房间号为 1 到 **N**）和 **M** 个双向走廊。**每一层的起始房间**都是 S 号房，**出口房间**都是 E 号房。同时，每层楼都有一个单独的宝藏房间；第 i 层的宝藏在 $\mathbf{R}_i$ 号房间内。**不同楼层的宝藏房间号可能不同**。

你从第一层的起始房间开始，可以通过走廊在相连的房间之间移动。当到达出口房间时，你有**3个选项**：退出地牢、去到下一层（楼层数加 1）、或者移动到同一楼层的另一个相邻房间。每当你进入一层，你始终从起始房间开始。

你肚子里储存的能量初始值为 **B**。每穿过一个走廊，数值减 1。**当你去下一层时，能量值不减。**当能量值归 0 时，你必须离开地牢（从任意出口房间）。请找到在初始能量值为 **B** 时，求可收集到的最大宝藏数量。

输入格式

输入的第一行包含一个整数 T ，表示测试用例的数量。对于每一个测试用例:

- 第一行包含两个用空格分隔的整数 F B，其中:
  - F 表示神秘地牢的层数。
  - B 表示你的初始能量值。
- 第二行包含四个用空格分隔的整数 N M S E，其中:
  - N 表示神秘地牢每一层的房间数。
  - M 表示神秘地牢每一层的走廊数。
  - S 表示每一层起始房间的房间号。
  - E 表示每一层出口房间的房间号。
- 第三行包含 F 个用空格分隔的整数 R_1 R_2 ⋯ R_F，表示第 i 层的宝藏房间号为 R_i。
- 对于接下来 M 行中的每一行，第 i 行包含两个用空格分隔的整数 U_i V_i ，表示每层的走廊连接房间 U_i 和 V_i。

输出格式

对于每一个测试用例，输出一行，包含你可以收集到的最大宝藏数量。

数据范围

$1 \le T \le 100$

$3 \le N, M \le 10^5$

$S \ne E$

对于所有 i，$R_i \ne S$ and $R_i \ne E$

对于所有 i，$U_i \ne V_i$

一个测试文件中所有测试用例的 N 之和不超过 10^5。

一个测试文件中所有测试用例的 M 之和不超过 10^5。

两个房间之间最多只有一条走廊。

走廊的设置确保你可以从任意一个房间通过一系列走廊到达任意一个其他房间。

主要测试集

$1 \le F \le 100$

$1 \le B \le 10^3$

一个测试文件中所有测试用例的 F 之和不超过 100。

一个测试文件中所有测试用例的 B 之和不超过 10^3。

附加测试集

$1 \le F \le 10^5$

$1 \le B \le 10^9$

一个测试文件中所有测试用例的 F 之和不超过 10^5。

测试样例

样例输入 下载

```
5
3 6
5 5 3 4
1 2 5
2 4
4 1
1 5
1 3
5 3
3 12
3 3 3 1
2 2 2
3 2
3 1
2 1
4 7
6 8 2 6
5 1 3 4
3 5
3 1
1 5
6 1
1 4
4 2
4 6
2 6
4 8
5 6 1 3
4 2 2 5
4 3
4 2
2 3
2 5
5 3
5 1
1 3
6 5 2 4
5
1 6
5 1
1 4
3 5
2 3
```

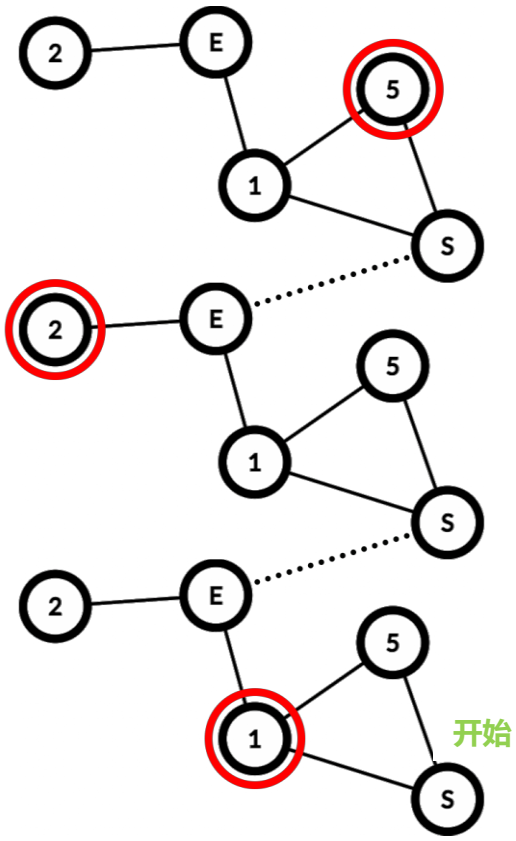
样例输出 下载

```
2
3
2
2
0
```

样例解释

对于每个测试样例，起始房间和出口房间分别用 **S** 和 **E** 标识。宝藏房间用红色圈出。第一层显示在底部，第 **F** 层显示在顶部。

测试用例#1:
神秘地牢如下图所示（标识 3 和 4 分别用 S 和 E 代替）：

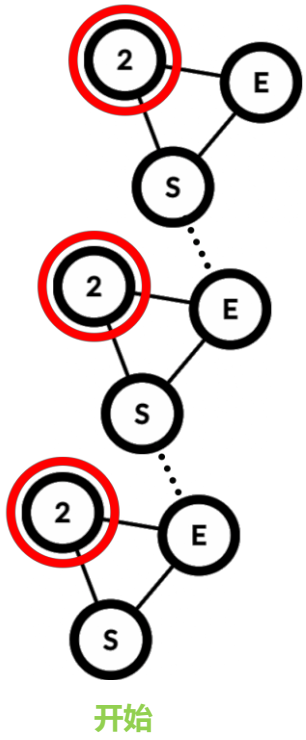


当 **B** = 6 时，通过以下步骤，你最多可以收集到 2 件宝藏：

1. **S** → 1: 收集这层楼的宝藏
2. 1 → **E**: 前往下一层的 **S**
3. **S** → 1
4. 1 → **E**
5. **E** → 2: 收集这层楼的宝藏
6. 2 → **E**: 离开地牢

通过以上步骤，当能量值剩余 0 时离开地牢。注意，我们只探索了地牢的前两层。

测试用例#2:
神秘地牢如下图所示（标识 3 和 1 分别用 S 和 E 代替）：

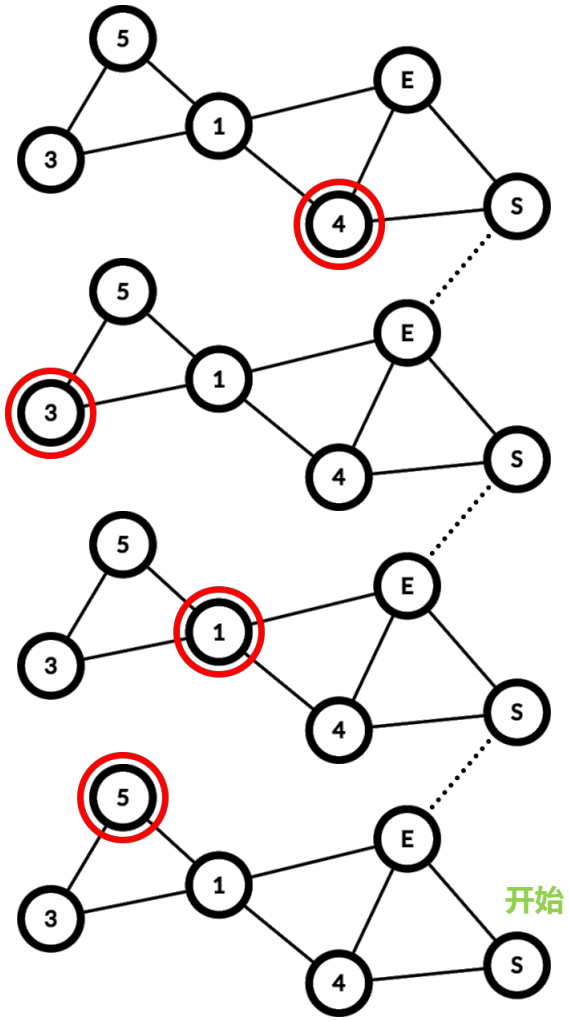


当 **B** = 12 时，通过以下步骤，你最多可以收集到 3 件宝藏：

1. **S** → 2: 收集这层楼的宝藏
2. 2 → **E**: 前往下一层的 **S**
3. **S** → 2: 收集这层楼的宝藏
4. 2 → **E**: 前往下一层的 **S**
5. **S** → 2: 收集这层楼的宝藏
6. 2 → **E**: 离开地牢

通过以上步骤，当能量值剩余 6 时离开地牢。注意，有多种方法可以收集到 3 件宝藏。

测试用例#3:
神秘地牢如下图所示（标识 2 和 6 分别用 S 和 E 代替）：

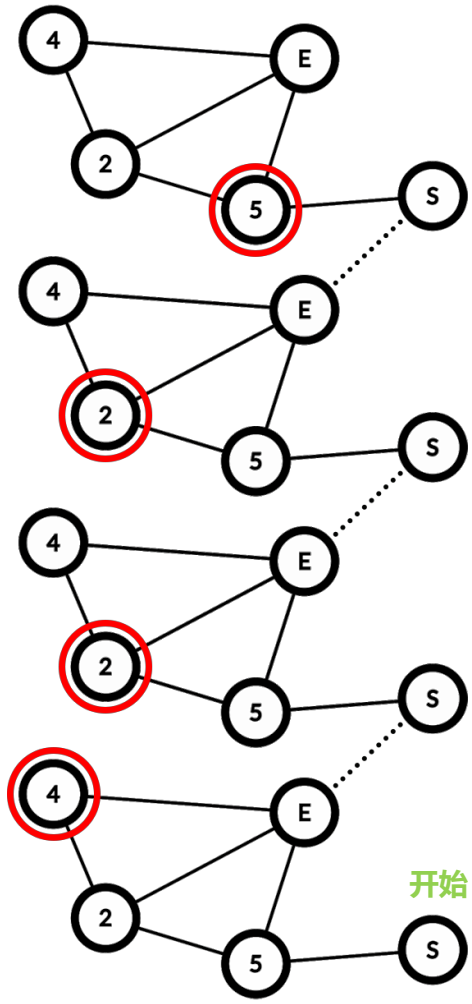


当 **B = 7** 时，探索所有的 4 层楼最多可以获得 2 件宝藏：

1. **S → E**（前往下一层）
2. **S → 4 → K_2 = 1 → E**（前往下一层）
3. **S → E**（前往下一层）
4. **S → K_4 = 4 → E**（离开，剩余0能量值）

注意，有多种方法可以收集到 2 件宝藏。

测试用例#4:
神秘地牢如下图所示（标识 1 和 3 分别用 S 和 E 代替）：



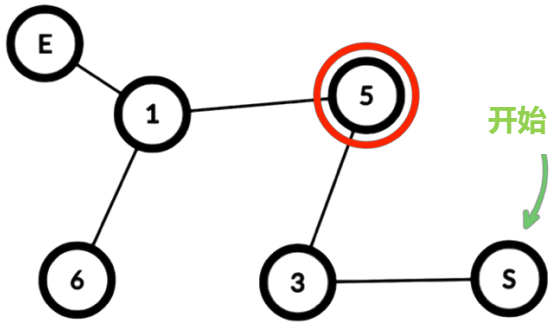
当 **B = 8** 时，探索前 3 层楼最多可以获得 2 件宝藏：

1. **S → 5 → E**（前往下一层）
2. **S → 5 → K_2 = 2 → E**（前往下一层）
3. **S → 5 → K_3 = 2 → E**（离开，剩余0能量值）

注意，有多种方法可以收集到 2 件宝藏，包括仅使用 7 个能量值或只探索前两层的方法。

测试用例#5:

神秘地牢如下图所示（标识 2 和 4 分别用 S 和 E 代替）：



注意，地牢仅有 1 层。然而，当 **B = 3** 时，你不可能在能量值耗尽（等于 0）之前收集宝藏并离开地牢。所以你能收集到的最大宝藏数为 0。