

Contest Duration: 2025-06-28(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250628T2100&p1=248>) - 2025-06-28(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250628T2240&p1=248>) (local time) (100 minutes)

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D - Make 2-Regular Graph

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 425 points

Problem Statement

There is a simple undirected graph G with N vertices and M edges. The vertices are numbered $1, 2, \dots, N$, and the i -th edge is an undirected edge connecting vertices A_i and B_i .

You can repeat the following two operations in any order and any number of times:

- Add one undirected edge to G
- Remove one undirected edge from G

Find the minimum number of operations to make G a simple undirected graph where all vertices have degree 2.

► What is a simple undirected graph?

Constraints

- $3 \leq N \leq 8$
- $0 \leq M \leq \frac{N(N-1)}{2}$
- The graph G given in the input is a simple undirected graph.
- All input values are integers.

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Input

The input is given from Standard Input in the following format:

```
 $N$   $M$   
 $A_1$   $B_1$   
 $\vdots$   
 $A_M$   $B_M$ 
```

Output

Output the answer.

Sample Input 1

[Copy](#)

```
5 4  
1 2  
1 5  
2 4  
4 5
```

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Sample Output 1

[Copy](#)

```
3
```

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For example, the following three operations make G a simple undirected graph where all vertices have degree 2.

- Add an edge connecting vertices 2 and 3.
- Remove the edge connecting vertices 2 and 4.
- Add an edge connecting vertices 3 and 4.

Sample Input 2

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```
3 0
```

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Sample Output 2

[Copy](#)

```
3
```

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Sample Input 3

[Copy](#)

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

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Sample Output 3

[Copy](#)

```
2
```

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Sample Input 4

[Copy](#)

```
8 21
1 4
5 7
8 4
3 4
2 5
8 1
5 1
2 8
2 1
2 4
3 1
6 7
5 8
2 7
6 8
5 4
3 8
7 3
7 8
5 3
7 4
```

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Sample Output 4

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```
13
```

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