**BÀI TẬP TOÁN RỜI RẠC 2 – CHƯƠNG 6**

**Câu hỏi 1**

Cho mạng G = <V, E> gồm 6 đỉnh được biểu diễn dưới dạng ma trận trọng số như sau

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | **0** | 18 | ∞ | ∞ | 8 | ∞ |
| 2 | ∞ | **0** | 5 | 3 | 2 | ∞ |
| 3 | ∞ | ∞ | **0** | 2 | ∞ | 7 |
| 4 | ∞ | ∞ | ∞ | **0** | ∞ | 15 |
| 5 | ∞ | ∞ | ∞ | 9 | **0** | ∞ |
| 6 | ∞ | ∞ | ∞ | ∞ | ∞ | **0** |

Sử dụng thuật toán đường tăng luồng tìm luồng cực đại trên mạng đồ thị G đã cho, chỉ rõ kết quả tại mỗi bước thực hiện theo thuật toán.

**Giải**

Số đỉnh n = 6; đỉnh phát s = 1 và đỉnh thu t = 6.

**Lập bảng:**

**Khởi tạo**:

|  |  |
| --- | --- |
| **Mạng G** | **Luồng f** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | **0** | 18 | 0 | 0 | 8 | 0 | | 2 | 0 | **0** | 5 | 3 | 2 | 0 | | 3 | 0 | 0 | **0** | 2 | 0 | 7 | | 4 | 0 | 0 | 0 | **0** | 0 | 15 | | 5 | 0 | 0 | 0 | 9 | **0** | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | **0** | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 0 |

**Bước 1:**

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 18 | 0 | 0 | 8 | 0 | | 2 | 0 | 0 | 5 | 3 | 2 | 0 | | 3 | 0 | 0 | 0 | 2 | 0 | 7 | | 4 | 0 | 0 | 0 | 0 | 0 | 15 | | 5 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | **0** | 18 | 0 | 0 | 8 | 0 | | 2 | 0 | **0** | 5 | 3 | 2 | 0 | | 3 | 0 | 0 | **0** | 2 | 0 | 7 | | 4 | 0 | 0 | 0 | **0** | 0 | 15 | | 5 | 0 | 0 | 0 | 9 | **0** | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | **0** | |

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| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1), 5(1); 3(2), 4(2); 6(3)}  Đường tăng luồng:  6 ← 3 ← 2 ← 1  Giá trị tăng luồng:  δ = 5 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 5 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 5 |

**Bước 2:**

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 18 | 0 | 0 | 8 | 0 | | 2 | 0 | 0 | 5 | 3 | 2 | 0 | | 3 | 0 | 0 | 0 | 2 | 0 | 7 | | 4 | 0 | 0 | 0 | 0 | 0 | 15 | | 5 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 5 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 13 | 0 | 0 | 8 | 0 | | 2 | 5- | 0 | 0 | 3 | 2 | 0 | | 3 | 0 | 5- | 0 | 2 | 0 | 2 | | 4 | 0 | 0 | 0 | 0 | 0 | 15 | | 5 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 5- | 0 | 0 | 0 | |

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| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1), 5(1); 4(2); 6(4); 3(6)}  Đường tăng luồng:  6 ← 4 ← 2 ← 1  Giá trị tăng luồng:  δ = 3 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 8 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 3 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 3 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 8 |

**Bước 3:**

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| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 18 | 0 | 0 | 8 | 0 | | 2 | 0 | 0 | 5 | 3 | 2 | 0 | | 3 | 0 | 0 | 0 | 2 | 0 | 7 | | 4 | 0 | 0 | 0 | 0 | 0 | 15 | | 5 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 8 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 3 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 3 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 10 | 0 | 0 | 8 | 0 | | 2 | 8- | 0 | 0 | 0 | 2 | 0 | | 3 | 0 | 5- | 0 | 2 | 0 | 2 | | 4 | 0 | 3- | 0 | 0 | 0 | 12 | | 5 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 5- | 3- | 0 | 0 | |

|  |  |
| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1), 5(1); 4(5); 6(4); 3(6)}  Đường tăng luồng:  6 ← 4 ← 5 ← 1  Giá trị tăng luồng:  δ = 8 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 8 | 0 | 0 | 8 | 0 | | 2 | 0 | 0 | 5 | 3 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 11 | | 5 | 0 | 0 | 0 | 8 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 16 |

**Bước 4**:

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 |  | 3 | 4 | 5 | 6 | | 1 | 0 | 18 | 0 | 0 | 8 | 0 | | 2 | 0 | 0 | 5 | 3 | 2 | 0 | | 3 | 0 | 0 | 0 | 2 | 0 | 7 | | 4 | 0 | 0 | 0 | 0 | 0 | 15 | | 5 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 8 | 0 | 0 | 8 | 0 | | 2 | 0 | 0 | 5 | 3 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 11 | | 5 | 0 | 0 | 0 | 8 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 10 | 0 | 0 | 0 | 0 | | 2 | 8- | 0 | 0 | 0 | 2 | 0 | | 3 | 0 | 5- | 0 | 2 | 0 | 2 | | 4 | 0 | 3- | 0 | 0 | 8- | 4 | | 5 | 8- | 0 | 0 | 1 | 0 | 0 | | 6 | 0 | 0 | 5- | 11- | 0 | 0 | |

|  |  |
| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1); 5(2); 4(5); 3(4); 6(4)}  Đường tăng luồng:  6 ← 4 ← 5 ←2 ← 1  Giá trị tăng luồng:  δ = 1 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 9 | 0 | 0 | 8 | 0 | | 2 | 0 | 0 | 5 | 3 | 1 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 12 | | 5 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 17 |

**Bước 5**:

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 18 | 0 | 0 | 8 | 0 | | 2 | 0 | 0 | 5 | 3 | 2 | 0 | | 3 | 0 | 0 | 0 | 2 | 0 | 7 | | 4 | 0 | 0 | 0 | 0 | 0 | 15 | | 5 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 9 | 0 | 0 | 8 | 0 | | 2 | 0 | 0 | 5 | 3 | 1 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 12 | | 5 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 9 | 0 | 0 | 0 | 0 | | 2 | 9- | 0 | 0 | 0 | 1 | 0 | | 3 | 0 | 5- | 0 | 2 | 0 | 2 | | 4 | 0 | 3- | 0 | 0 | 9- | 3 | | 5 | 8- | 1- | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 5- | 12- | 0 | 0 | |

|  |
| --- |
| **Tìm đường tăng luồng** |
| Bfs(1) = {1(0); 2(1); 5(2)}  Không tìm được đường tăng luồng. |

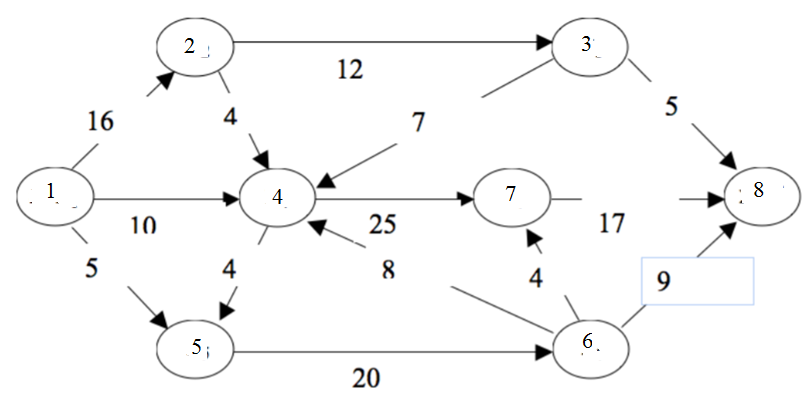
**Kết luận:** Val(f) = 17

Luồng cực đại f:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 0 | 9 | 0 | 0 | 8 | 0 |
| 2 | 0 | 0 | 5 | 3 | 1 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 5 |
| 4 | 0 | 0 | 0 | 0 | 0 | 12 |
| 5 | 0 | 0 | 0 | 9 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 |

**Câu hỏi 2**

Cho mạng G = <V, E> gồm 8 đỉnh được biểu diễn như hình sau



Sử dụng thuật toán đường tăng luồng tìm luồng cực đại trên mạng đồ thị G đã cho, chỉ rõ kết quả tại mỗi bước thực hiện theo thuật toán.

**Giải**

Số đỉnh n = 8; đỉnh phát s = 1 và đỉnh thu t = 8.

Lập bảng:

**Khởi tạo**:

|  |  |
| --- | --- |
| **Mạng G** | **Luồng f** |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 0 |

**Bước 1:**

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

|  |  |
| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1), 4(1), 5(1); 3(2), 7(4); 6(5); 8(3)}  Đường tăng luồng:  8 ← 3 ← 2 ← 1  Giá trị tăng luồng:  δ = 5 | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 5 |

**Bước 2:**

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 11 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 5- | 0 | 7 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 5- | 0 | 7 | 0 | 0 | 0 | 0 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 5- | 0 | 0 | 0 | 0 | 0 | |

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| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1), 4(1), 5(1); 3(2), 7(4); 6(5); 8(7)}  Đường tăng luồng:  8 ← 7 ← 4 ← 1  Giá trị tăng luồng:  δ = 10 | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 5 | 0 | 10 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 15 |

**Bước 3:**

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 5 | 0 | 10 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 11 | 0 | 0 | 5 | 0 | 0 | 0 | | 2 | 5- | 0 | 7 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 5- | 0 | 7 | 0 | 0 | 0 | **0** | | 4 | 10- | 0 | 0 | 0 | 4 | 0 | 15 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 10- | 0 | 0 | 0 | 7 | | 8 | 0 | 0 | 5- | 0 | 0 | 0 | 10- | 0 | |

|  |  |
| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1), 5(1); 3(2), 4(2); 6(5); 7(4); 8(6)}  Đường tăng luồng:  8 ← 6 ← 5 ← 1  Giá trị tăng luồng:  δ = 5 | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 5 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 20 |

**Bước 4:**

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 5 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 5- | 0 | 7 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 5- | 0 | 7 | 0 | 0 | 0 | 0 | | 4 | 10- | 0 | 0 | 0 | 4 | 0 | 15 | 0 | | 5 | 5- | 0 | 0 | 0 | 0 | 15 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 5- | 0 | 4 | 4 | | 7 | 0 | 0 | 0 | 10- | 0 | 0 | 0 | 7 | | 8 | 0 | 0 | 5- | 0 | 0 | 5- | 10- | 0 | |

|  |  |
| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1); 3(2), 4(2); 5(4); 7(4); 6(5); 8(7)}  Đường tăng luồng:  8 ← 7 ← 4 ← 2 ← 1  Giá trị tăng luồng:  δ = 4 | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 9 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 24 |

**Bước 5:**

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 9 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 5 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 9- | 0 | 7 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 5- | 0 | 7 | 0 | 0 | 0 | 0 | | 4 | 10- | 4- | 0 | 0 | 4 | 0 | 11 | 0 | | 5 | 5- | 0 | 0 | 0 | 0 | 15 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 5- | 0 | 4 | 4 | | 7 | 0 | 0 | 0 | 14- | 0 | 0 | 0 | 3 | | 8 | 0 | 0 | 5- | 0 | 0 | 5- | 14- | 0 | |

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| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1); 3(2); 4(3); 5(4), 7(4); 6(5); 8(7)}  Đường tăng luồng:  8 ← 7 ← 4 ← 3 ← 2 ← 1  Giá trị tăng luồng:  δ = 3 | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 12 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 8 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 27 |

**Bước 6:**

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 12 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 8 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 12- | 0 | 4 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 8- | 0 | 4 | 0 | 0 | 0 | 0 | | 4 | 10- | 4- | 3- | 0 | 4 | 0 | 8 | 0 | | 5 | 5- | 0 | 0 | 0 | 0 | 15 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 5- | 0 | 4 | 4 | | 7 | 0 | 0 | 0 | 17- | 0 | 0 | 0 | 0 | | 8 | 0 | 0 | 5- | 0 | 0 | 5- | 17- | 0 | |

|  |  |
| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0); 2(1); 3(2); 4(3); 5(4), 7(4); 6(5); 8(6)}  Đường tăng luồng:  8 ← 6 ← 5 ← 4 ← 3 ← 2 ← 1  Giá trị tăng luồng:  δ = 4 | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 17 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 31 |

**Bước 7:**

|  |  |  |
| --- | --- | --- |
| **Mạng G** | **Luồng f** | **Đồ thị Gf** |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 25 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 17 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 16- | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 12- | 0 | 0 | 0 | 0 | 0 | 0 | | 4 | 10- | 4- | 7- | 0 | 0 | 0 | 8 | 0 | | 5 | 5- | 0 | 0 | 4- | 0 | 11 | 0 | 0 | | 6 | 0 | 0 | 0 | 8 | 9- | 0 | 4 | 0 | | 7 | 0 | 0 | 0 | 17- | 0 | 0 | 0 | 0 | | 8 | 0 | 0 | 5- | 0 | 0 | 9- | 17- | 0 | |

|  |  |
| --- | --- |
| **Tìm đường tăng luồng** | **Tăng luồng f** |
| Bfs(1) = {1(0)}  Không tìm được đường tăng luồng | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 | | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 17 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 31 |

**Kết luận:** Val(f) = 31

Luồng cực đại f:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | 0 | 16 | 0 | 10 | 5 | 0 | 0 | 0 |
| 2 | 0 | 0 | 12 | 4 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 5 |
| 4 | 0 | 0 | 0 | 0 | 4 | 0 | 17 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Ví dụ số**:

**Khởi tạo**:

|  |  |
| --- | --- |
| **Mạng G** | **Luồng f** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 5 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 6 | 3 | 0 | | 3 | 0 | 0 | 0 | 3 | 1 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 6 | | 5 | 0 | 0 | 0 | 0 | 0 | 6 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 0 |

**Bước 1:**

|  |  |  |
| --- | --- | --- |
| **Mạng Gf** | **Tìm đường tăng luồng** | **Luồng f** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 5 | 5 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 6 | 3 | 0 | | 3 | 0 | 0 | 0 | 3 | 1 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 6 | | 5 | 0 | 0 | 0 | 0 | 0 | 6 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | Bfs(1) = {1(0); 2(1), 3(1); 4(2), 5(2); 6(4)}  Đường tăng luồng:  6 ← 4 ← 2 ← 1  Giá trị tăng luồng:  δ = 5 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 5 | 0 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 5 | 0 | 0 | | 3 | 0 | 0 | 0 | 0 | 0 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 5 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 5 |

**Bước 2:**

|  |  |  |
| --- | --- | --- |
| **Mạng Gf** | **Tìm đường tăng luồng** | **Luồng f** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 0 | 5 | 0 | 0 | 0 | | 2 | 5- | 0 | 0 | 1 | 3 | 0 | | 3 | 0 | 0 | 0 | 3 | 1 | 0 | | 4 | 0 | 5- | 0 | 0 | 0 | 1 | | 5 | 0 | 0 | 0 | 0 | 0 | 6 | | 6 | 0 | 0 | 0 | 5- | 0 | 0 | | Bfs(1) = {1(0); 3(1); 4(3); 5(3); 2(4), 6(4)}  Đường tăng luồng:  6 ← 4 ← 3 ← 1  Giá trị tăng luồng:  δ = 1 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 5 | 1 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 5 | 0 | 0 | | 3 | 0 | 0 | 0 | 1 | 0 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 6 | | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 6 |

**Bước 3:**

|  |  |  |
| --- | --- | --- |
| **Mạng Gf** | **Tìm đường tăng luồng** | **Luồng f** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 0 | 4 | 0 | 0 | 0 | | 2 | 5- | 0 | 0 | 1 | 3 | 0 | | 3 | 1- | 0 | 0 | 2 | 1 | 0 | | 4 | 0 | 5- | 1- | 0 | 0 | 0 | | 5 | 0 | 0 | 0 | 0 | 0 | 6 | | 6 | 0 | 0 | 0 | 6- | 0 | 0 | | Bfs(1) = {1(0); 3(1); 4(3); 5(3); 2(4); 6(5)}  Đường tăng luồng:  6 ← 5 ← 3 ← 1  Giá trị tăng luồng:  δ = 1 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 5 | 2 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 5 | 0 | 0 | | 3 | 0 | 0 | 0 | 1 | 1 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 6 | | 5 | 0 | 0 | 0 | 0 | 0 | 1 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 7 |

**Bước 4**:

|  |  |  |
| --- | --- | --- |
| **Mạng Gf** | **Tìm đường tăng luồng** | **Luồng f** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 0 | 3 | 0 | 0 | 0 | | 2 | 5- | 0 | 0 | 1 | 3 | 0 | | 3 | 2- | 0 | 0 | 2 | 0 | 0 | | 4 | 0 | 5- | 1- | 0 | 0 | 0 | | 5 | 0 | 0 | 1- | 0 | 0 | 5 | | 6 | 0 | 0 | 0 | 6- | 1- | 0 | | Bfs(1) = {1(0); 3(1); 4(3); 2(4); 5(2); 6(5)}  Đường tăng luồng:  6 ← 5 ← 2 ←4 ← 3 ← 1  Giá trị tăng luồng:  δ = 2 | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 5 | 4 | 0 | 0 | 0 | | 2 | 0 | 0 | 0 | 3 | 2 | 0 | | 3 | 0 | 0 | 0 | 3 | 1 | 0 | | 4 | 0 | 0 | 0 | 0 | 0 | 6 | | 5 | 0 | 0 | 0 | 0 | 0 | 3 | | 6 | 0 | 0 | 0 | 0 | 0 | 0 |   Val(f) = 9 |

**Bước 5**:

|  |  |
| --- | --- |
| **Mạng Gf** | **Tìm đường tăng luồng** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | | 1 | 0 | 0 | 1 | 0 | 0 | 0 | | 2 | 5- | 0 | 0 | 3 | 1 | 0 | | 3 | 4- | 0 | 0 | 0 | 0 | 0 | | 4 | 0 | 3- | 3- | 0 | 0 | 0 | | 5 | 0 | 2- | 1- | 0 | 0 | 3 | | 6 | 0 | 0 | 0 | 6- | 3- | 0 | | Bfs(1) = {1(0); 3(1}  Không tìm được đường tăng luồng. |

**Kết luận:** Val(f) = 9

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 0 | 5 | 4 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 3 | 2 | 0 |
| 3 | 0 | 0 | 0 | 3 | 1 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 6 |
| 5 | 0 | 0 | 0 | 0 | 0 | 3 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 |