# Practice 10 – Graph2

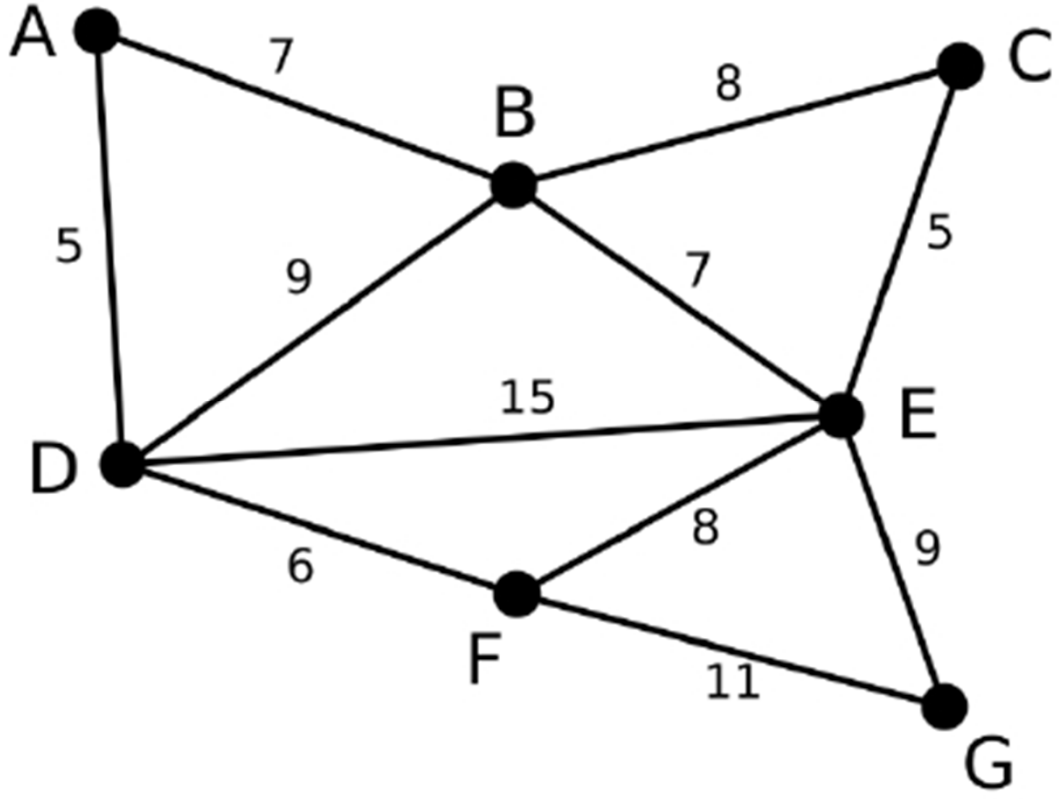
오늘
2019.05
음력
손없는날
기념일
일 월 화 수 목 금 토
28 29 30 1 근로자의날 2 3 4
5 음4.1 어린이날 6 대체 휴일 7 8 어버이날 9 10 11
12 부처님 … 13 14 15 스승의날 16 17 18
19 음4.15 20 21 Quiz2 22 23 Assign. 2 24 25
26 27 28 29 30 31 1
60갑자는 음력으로 계산됩니다. | 날짜계산은 기준일을 1일로 포함하여 계산됩니다.
관련검색 스포츠 일정 | 축제·행사 | 공연 | 날씨 | TV편성표 | 일출일몰시간 | 오늘의 운세 | 계산기

오늘 < 2019.06 > ☐ 음력 ☐ 손없는날 ☐ 기념일

| 일 | 월 | 화 | 수 | 목 | 금 | 토 |
|---|---|---|---|---|---|---|
| 26 | 27 | 28 | 29 | 30 | 31 | 1 |
| 2 | 3 음 5.1 | 4 Quiz3 | 5 | 6 현충일 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 음 5.15 | 18 Final | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 6.25 한… | 26 | 27 | 28 철도의 날 | 29 |
| 30 | 1 | 2 | 3 | 4 | 5 | 6 |

# Example of MST: **Prim's Algorithm**

- **Greedy algorithm :** expanding MST by adding the nearest vertex



# Ex1) Freckles

- **Problem**
  **: In an episode of the Dick Van Dyke show, little Richie connects the freckles on his Dad's back to from a picture of the Liberty Bell. Alas, one of the freckles turns out to be a scar, so his Ripley's engagement falls through.**
  **Consider Dick's back to be a plane with freckles at various $(x,y)$ locations. Your job is to tell Richie how to connect the dots so as to minimize the amount of ink used. Richie connects the dots by drawing straight lines between pairs, possibly lifting the pen between lines. When Richie is done there must be a sequence of connected lines from any freckle to any other freckle**

# Ex1) Freckles

- **Input**

  **1) The first line of test case contains $0 < n \leq 100$, giving the number of freckles on Dick's back.**

  **2) For each freckle, a line follows; each following line contain two real number indicating the $(x,y)$ coordinates of the freckle.**

- **Output**

  **For each test case, your program must print a single real number to two decimal places: the minimum total length of ink lines that can connect all the freckles.**

```
3
1.0 1.0
2.0 2.0
2.0 4.0
3.41
```

# Ex2) Shortest Path

- **Problem**

  **: Given a direction graph, write a program that finds the shortest path from a given starting point to all other vertices. However, the weights of all trunks are natural numbers less than 10.**

- **Input**

  **The number of vertices V and the number of trunks E are given in the first line. (1 ≤ V ≤ 20,000, 1 ≤ E ≤ 300,000) It is assumed that all vertices are numbered from 1 to V. In the second line, the number K (1 ≤ K ≤ V) of the starting vertex is given. From the third line, three integers (u, v, w) representing each truncation are given in order along the E lines. This means that there is a weight w edge from u to v. u and v are different and w is a natural number less than 10. Note that there may be several trunks between two different vertices.**

# Ex2) Shortest Path

- **Output**

  **Outputs the path value of the shortest path to the vertex i on the i-th line from the first line to the V-th line. The start point itself is output as 0, and if the path does not exist, the INF is output.**

```
5 6
1
5 1 1
1 2 2
1 3 3
2 3 4
2 4 5
3 4 6
0
2
3
7
INF
```