

Introduction to algorithm and analysis
Assignment 11 Solution

- ① Answer - a
Explanation - Vertex with no incoming edges is called as a source.
- ② Answer - a
Findset operation returns the representative element of a set S_x containing x .
- ③ Answer - d
- ④ Answer - a
- ⑤ Answer - d
Explanation - Path compression algo is performed during find operation and is independent of strategy used to perform unions.
- ⑥ Answer - c (by definition it follows)
- ⑦ Answer - b.
A simple acyclic path between source and sink which pass through only +ve weighted edges is called augmenting path.
- ⑧ Answer - c

Answer - a

⑨ For skew symmetry.

$$f(u, v) = (f_1 + f_2)(u, v) = f_1(u, v) + f_2(u, v) = -f_1(v, u)$$

$$= -f_2(v, u) = -(f_1 + f_2)(v, u) = -f(v, u)$$

Flow conservation -

$$\text{Let, } u \in V \setminus \{s, t\}$$

$$\sum_{v \in V} f(u, v) = \sum_{v \in V} f_1(u, v) + f_2(u, v) = 0.$$

Capacity constraints -

$$\text{Let, } V = \{s, t\} \quad E = \{(s, t)\}$$

$$c(s, t) = 1 \quad \text{Let, } f_1(s, t) = 1, \quad f_2(s, t) = 1$$

f_1, f_2 obey capacity constraints.

but $(f_1 + f_2)(u, v) = 2$ which violates capacity constraints.

⑩ Answer - b.