

# CSD2181/2183 – Data Structure

## Exercises

**Nisha Jain**

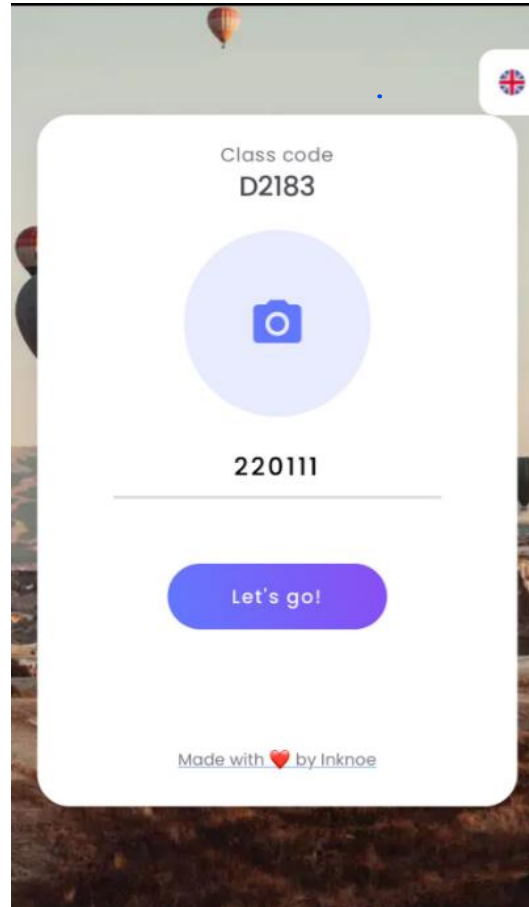
Assistant Professor

[nisha.jain@singaporetech.edu.sg](mailto:nisha.jain@singaporetech.edu.sg)



# Introduction – Data Structure Exercises

<https://www.classpoint.app/>



OR



# Introduction – Data Structure Exercises

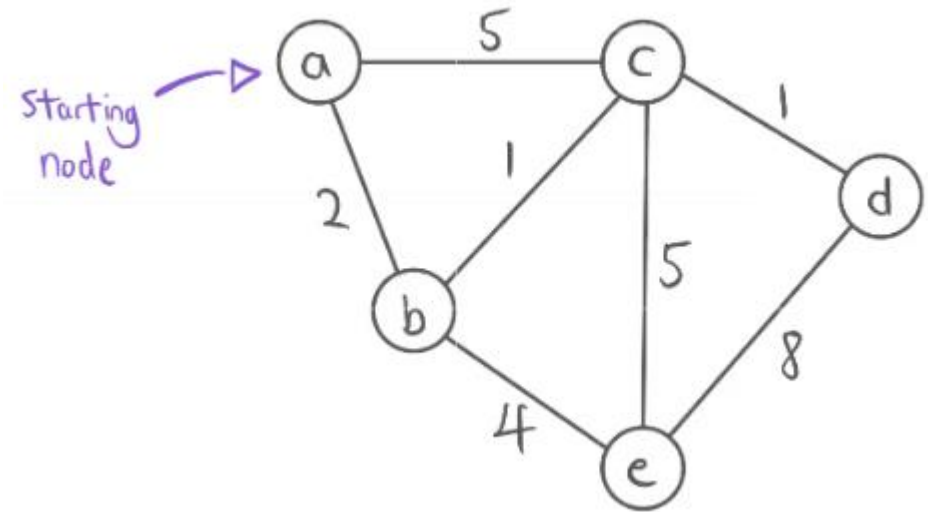
- Purpose: to reinforce what you have learned and practiced in lectures.
- The exercise session is conducted face to face in class.
- It consists of a few MCQs to be solved within class.
- Limited time is given for each question (answer will be discussed afterwards).
- You are required to login to ClassPoint with your student ID.
- So, bring along your laptop or devices with Internet access.
- Attendance is compulsory and there is no make up.
- Exercises are marked considering your overall performance in the module.

# Exercise Graphs

# Exercise 10 – Shortest Path

## 10.1 What are the initial cost values? (source node is a)

- A. a:0, b:0, c:0, d:0, e:0
- B. a:inf, b:inf, c:inf, d:inf, e:inf
- C. a:0, b:inf, c:inf, d:inf, e:inf
- D. a:0, b:2, c:5, d:1, e:4
- E. a:2, b:1, c:1, d:8, e:0

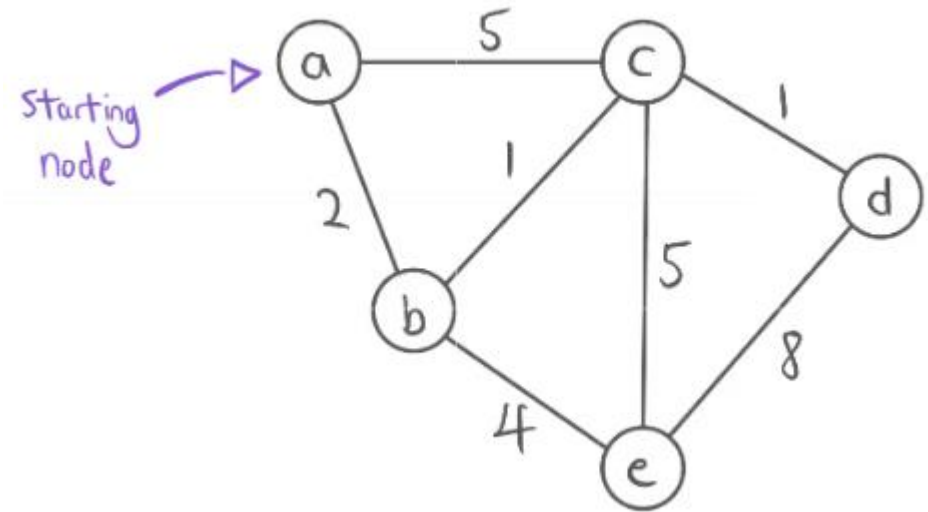


 Multiple Choice

# Exercise 10 – Shortest Path

## 10.1 What are the initial cost values? (source node is a)

- A. a:0, b:0, c:0, d:0, e:0
- B. a:inf, b:inf, c:inf, d:inf, e:inf
- C. a:0, b:inf, c:inf, d:inf, e:inf
- D. a:0, b:2, c:5, d:1, e:4
- E. a:2, b:1, c:1, d:8, e:0

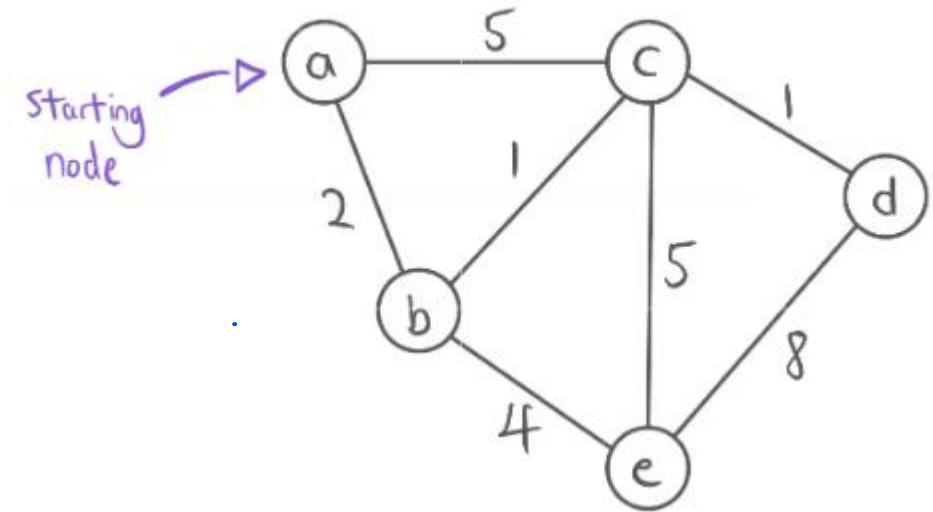


 Multiple Choice

# Exercise 10 – Shortest Path

**10.2 Show the order of nodes processed by the end of Dijkstra's algorithm.**

- A. a,b,c,d,e
- B. e,d,c,b,a
- C. a,b,e,c,d
- D. a,c,d,e,b

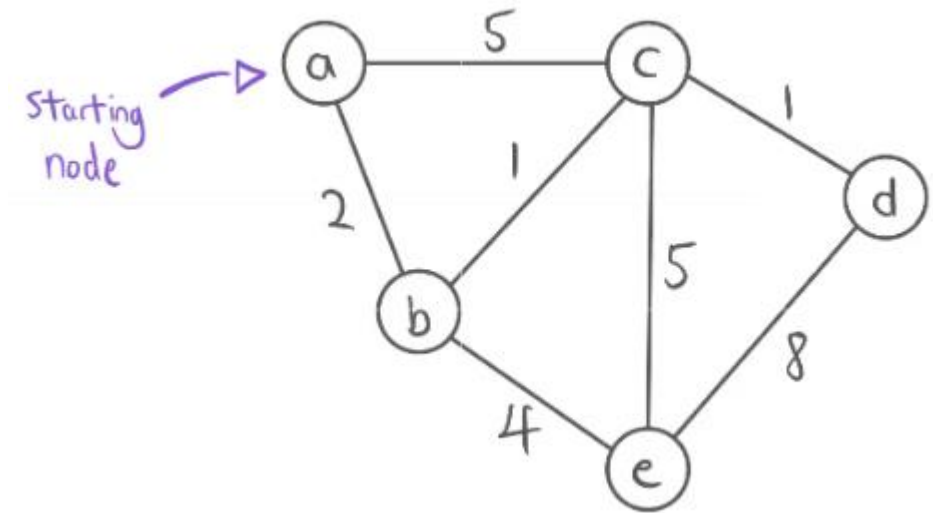


 Multiple Choice

# Exercise 10 – Shortest Path

**10.2 Show the order of nodes processed by the end of Dijkstra's algorithm.**

- A. a,b,c,d,e
- B. e,d,c,b,a
- C. a,b,e,c,d
- D. a,c,d,e,b



Sta

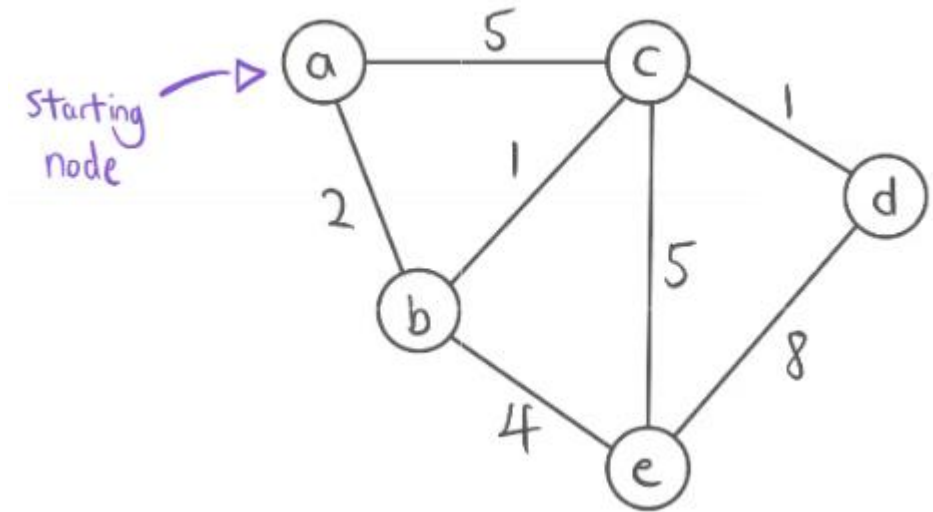
 Multiple Choice



# Exercise 10 – Shortest Path

**10.3 What is d->prev by the end of Dijkstra's algorithm?**

- A. a
- B. b
- C. c
- D. d
- E. e

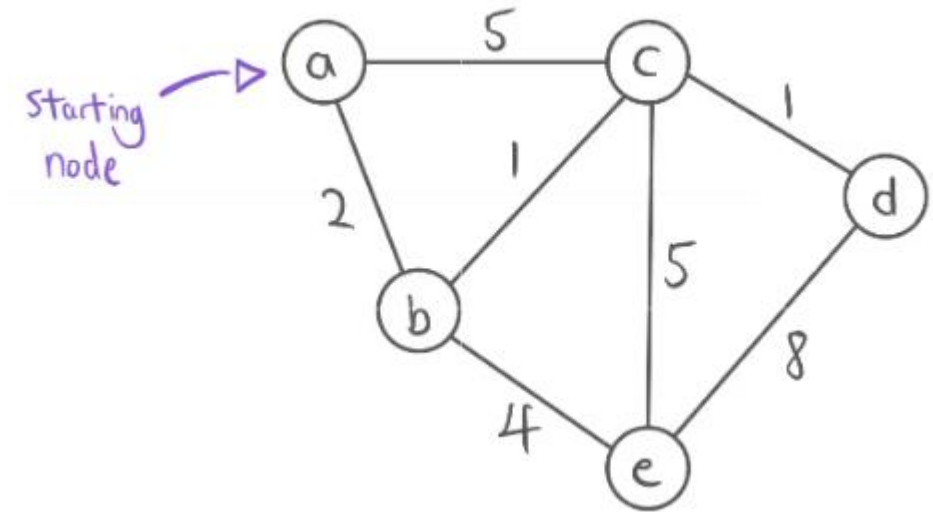


 Multiple Choice

# Exercise 10 – Shortest Path

**10.3 What is d->prev by the end of Dijkstra's algorithm?**

- A. a
- B. b
- C. **c**
- D. d
- E. e

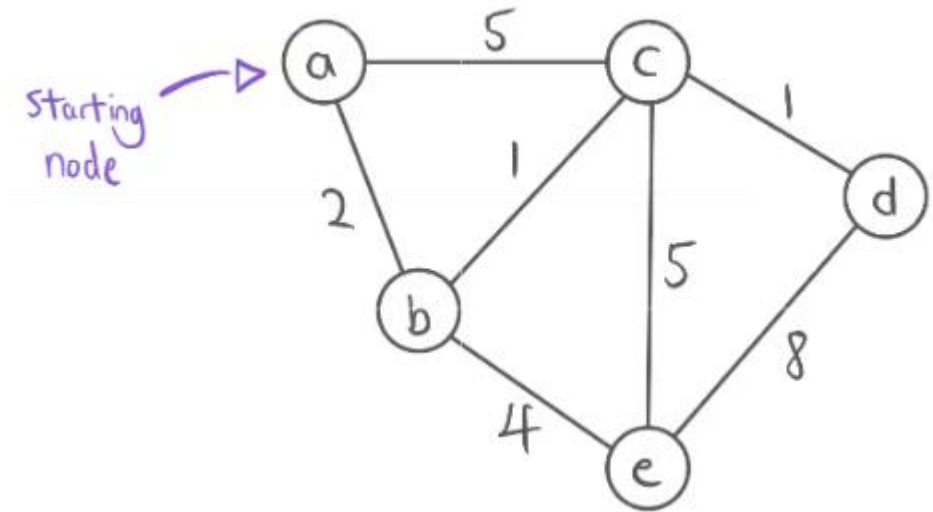


 Multiple Choice

# Exercise 10 – Shortest Path

**10.4 What is c->prev by the end of Dijkstra's algorithm?**

- A. a
- B. b
- C. c
- D. d
- E. e

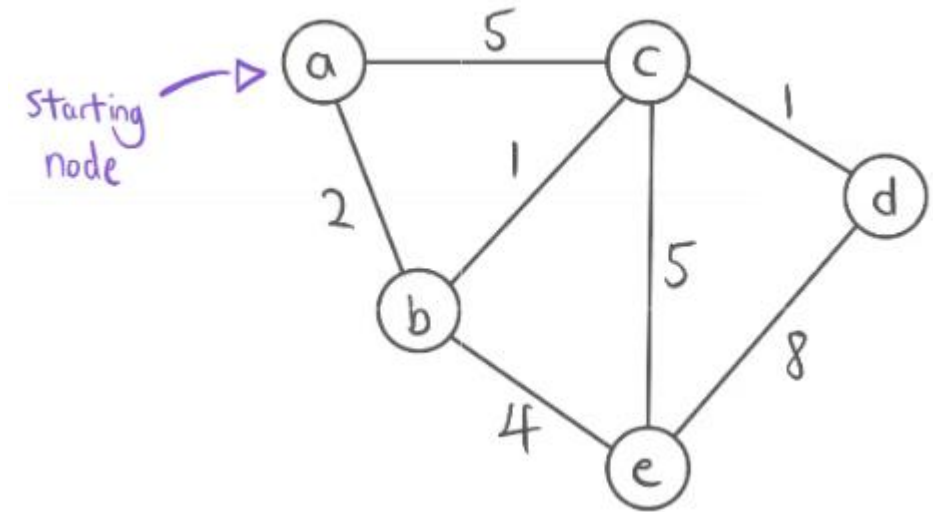


 Multiple Choice

# Exercise 10 – Shortest Path

**10.4 What is c->prev by the end of Dijkstra's algorithm?**

- A. a
- B. **b**
- C. c
- D. d
- E. e

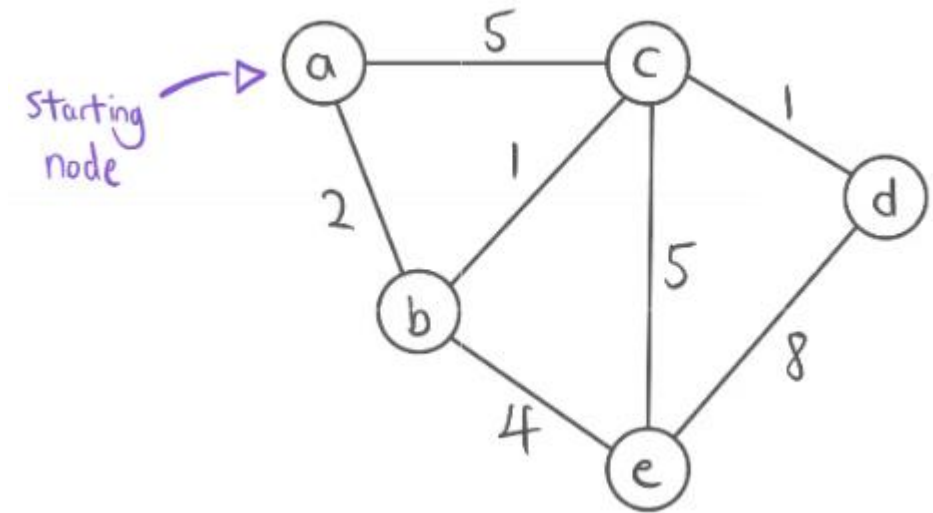


 Multiple Choice

## Exercise 10 – Shortest Path

**10.5 How many times was  $c \rightarrow \text{cost}$  updated after initialization to the end of Dijkstra's algorithm?**

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

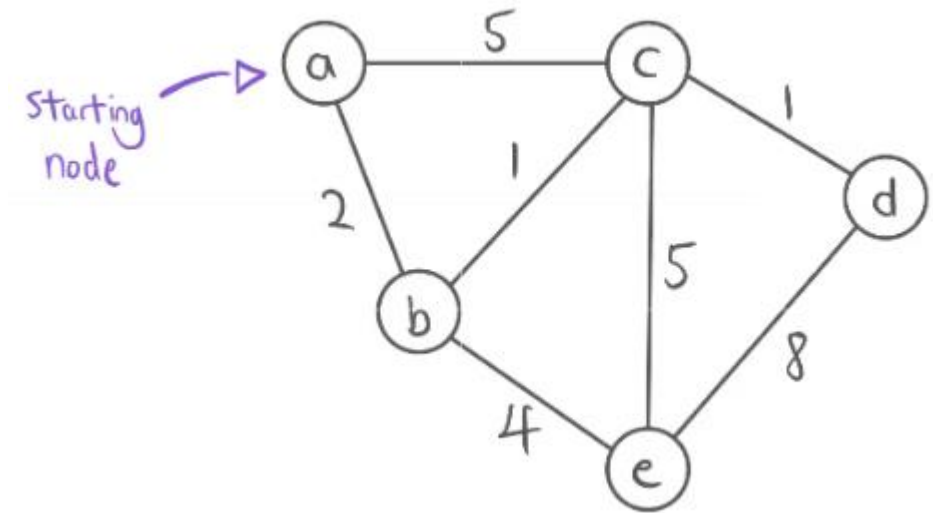


 Multiple Choice

## Exercise 10 – Shortest Path

**10.5 How many times was  $c \rightarrow \text{cost}$  updated after initialization to the end of Dijkstra's algorithm?**

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

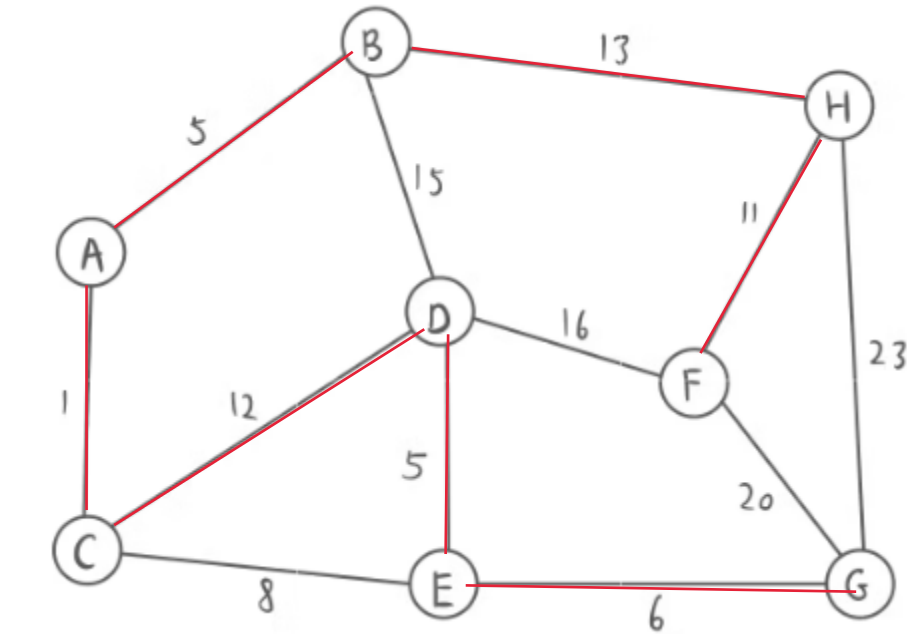


 Multiple Choice

# Exercise 10 – Minimum Spanning Tree

**10.6 Show the order of nodes processed using Prim's algorithm starting at G**

- A. A, C, B, E, D, G, H, F
- B. G, A, C, B, E, D, H, F
- C. G, E, D, C, A, B, H, F
- D. G, E, D, C, A, F, B, H
- E. G, E, F, H, C, D, A, B

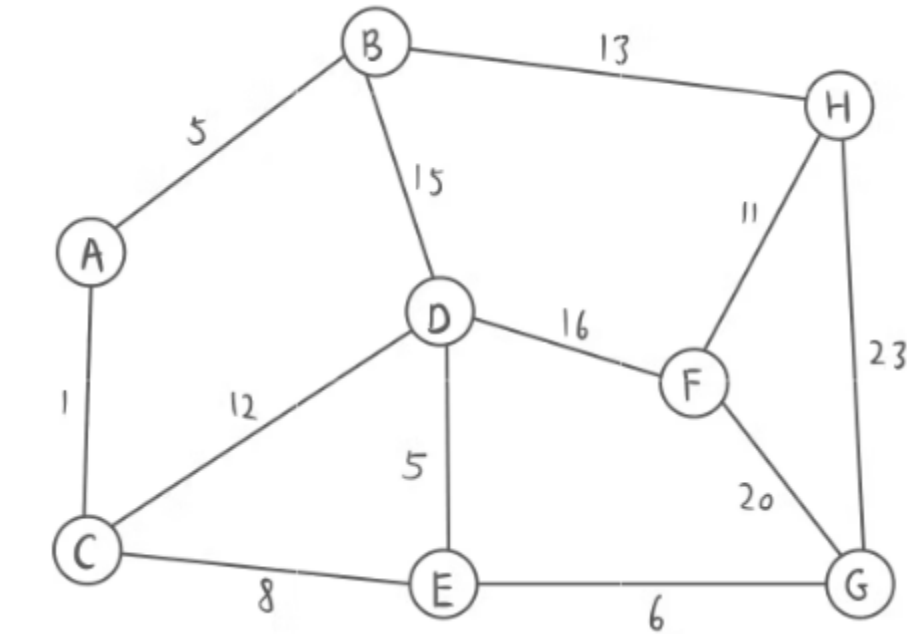


 Multiple Choice

# Exercise 10 – Minimum Spanning Tree

**10.6 Show the order of nodes processed using Prim's algorithm starting at G**

- A. A, C, B, E, D, G, H, F
- B. G, A, C, B, E, D, H, F
- C. **G, E, D, C, A, B, H, F**
- D. G, E, D, C, A, F, B, H
- E. G, E, F, H, C, D, A, B



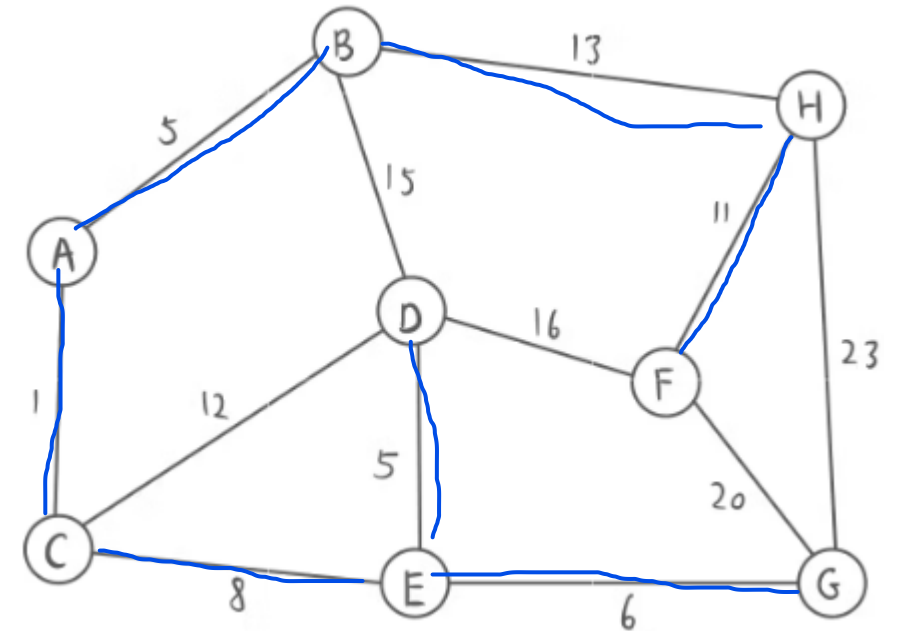
 Multiple Choice



# Exercise 10 – Minimum Spanning Tree

## 10.7 What are the edges spanned using Kruskal's algorithm

- A. BD, DE, FH, BH, AC, CE, EG
- B. AB, DE, FH, BH, AC, CE, EG
- C. AB, CD, FH, BH, AC, CE, EG
- D. AB, CD, DE, FH, BH, AC, EG

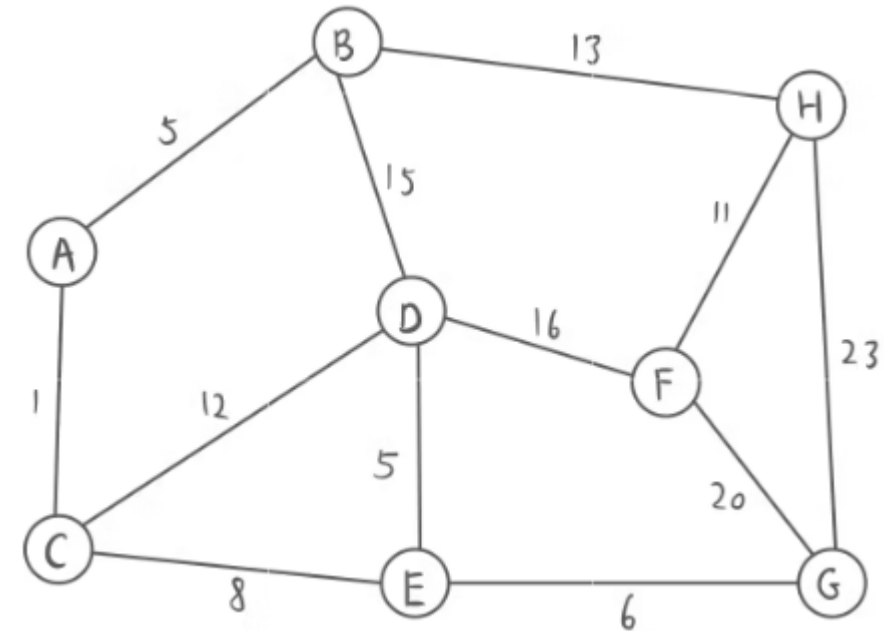


Multiple Choice

# Exercise 10 – Minimum Spanning Tree

## 10.7 What are the edges spanned using Kruskal's algorithm

- A. BD, DE, FH, BH, AC, CE, EG
- B. AB, DE, FH, BH, AC, CE, EG
- C. AB, CD, FH, BH, AC, CE, EG
- D. AB, CD, DE, FH, BH, AC, EG



 Multiple Choice

# Exercise Hashing

# Exercise 10 – Hashing

**10.8 Which hash function results in lesser collisions for a set of data of the following numbers?**

A.  $h(k) = (\text{int}) k/10000$

B.  $h(k) = k \% 10000$

⋮  
2569881232  
2569881233  
—  
2569881234  
2569881235  
2569881236  
⋮



Multiple Choice

# Exercise 10 – Hashing

**10.8 Which hash function results in lesser collisions for a set of data of the following numbers?**

A.  $h(k) = (\text{int}) k/10000$

B.  $h(k) = k \% 10000$

⋮  
2569881232  
2569881233  
—  
2569881234  
2569881235  
2569881236  
⋮



Multiple Choice

# Exercise 10 – Hashing

**10.9 Determine the load factor of the given open addressing hash table.**

- A. 1
- B.  $1/7$
- C.  $1/6$
- D.  $6/7$
- E. 2

	1	2	17	24	13	8
0	1	2	3	4	5	6



Multiple Choice

# Exercise 10 – Hashing

**10.9 Determine the load factor of the given open addressing hash table.**

- A. 1
- B.  $1/7$
- C.  $1/6$
- D.  $6/7$
- E. 2

	1	2	17	24	13	8
0	1	2	3	4	5	6

 Multiple Choice

# Exercise 10 – Hashing

**10.10 Determine the load factor of the given open addressing hash table.**

- A.  $7/9$
- B.  $3/9$
- C.  $1/9$
- D. 1
- E.  $4/9$

9		21	39					
0	1	2	3	4	5	6	7	8



Multiple Choice



# Exercise 10 – Hashing

**10.10 Determine the load factor of the given open addressing hash table.**

- A.  $7/9$
- B.  $3/9$
- C.  $1/9$
- D. 1
- E.  $4/9$

9		21	39					
0	1	2	3	4	5	6	7	8



Multiple Choice

## Exercise 10 – Hashing

**10.11 Consider the hash function below in an open addressing hash table**

$$h(k) = k \% 7$$

**Assuming linear probing. Determine number of probes after inserting 24**

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4
- F. 5

		2	17		13	
0	1	2	3	4	5	6



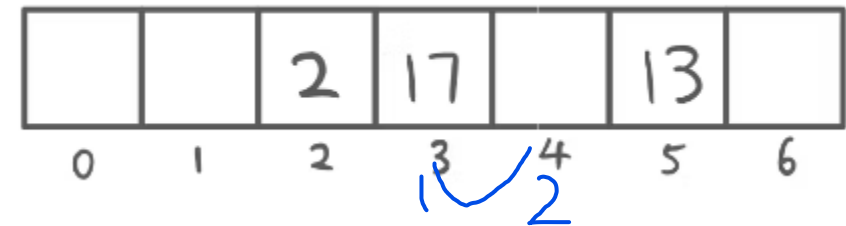
Multiple Choice

## Exercise 10 – Hashing

**10.11 Consider the hash function below in an open addressing hash table**  
 **$h(k) = k \% 7$**

**Assuming linear probing. Determine number of probes after inserting 24**

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4
- F. 5



Multiple Choice

## Exercise 10 – Hashing

**10.12 Consider the hash function below in an open addressing hash table**

$$h(k) = k \% 7$$

**Assuming linear probing. Determine number of probes after inserting 72**

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4
- F. 5

		2	17	24	13	
0	1	2	3	4	5	6



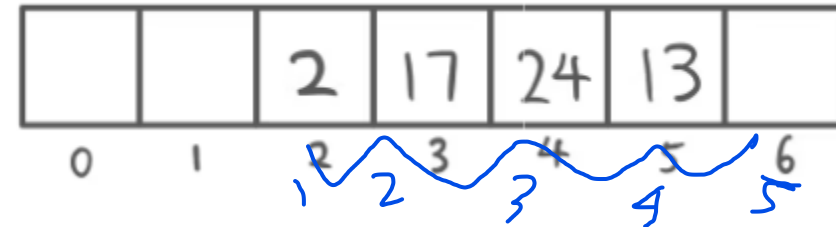
Multiple Choice

## Exercise 10 – Hashing

**10.12 Consider the hash function below in an open addressing hash table**  
 **$h(k) = k \% 7$**

**Assuming linear probing. Determine number of probes after inserting 72**

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4
- F. 5



Multiple Choice

## Exercise 10 – Hashing

**10.13 Consider the hash function below in an open addressing hash table**

$$h(k) = k \% 9$$

**Assuming quadratic probing. Where will 18 be stored?**

- A. 4
- B. 1
- C. 5
- D. 6
- E. 7

9		21	39					
0	1	2	3	4	5	6	7	8



Multiple Choice

## Exercise 10 – Hashing

**10.13 Consider the hash function below in an open addressing hash table**

$$h(k) = k \% 9$$

**Assuming quadratic probing. Where will 18 be stored?**

- A. 4
- B. 1
- C. 5
- D. 6
- E. 7

9		21	39					
0	1	2	3	4	5	6	7	8

 Multiple Choice

## Exercise 10 – Hashing

**10.14 Consider the hash function below in an open addressing hash table**

$$h(k) = k \% 9$$

**Assuming quadratic probing. Determine number of probes after inserting 3**

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4
- F. 5

9		21	39					
0	1	2	3	4	5	6	7	8



Multiple Choice



# Exercise 10 – Hashing

**10.14 Consider the hash function below in an open addressing hash table**

$$h(k) = k \% 9$$

**Assuming quadratic probing. Determine number of probes after inserting 3**

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4
- F. 5

9		21	39	3				
0	1	2	3	4	5	6	7	8

 Multiple Choice

The End