

# ' Assignment-02 '

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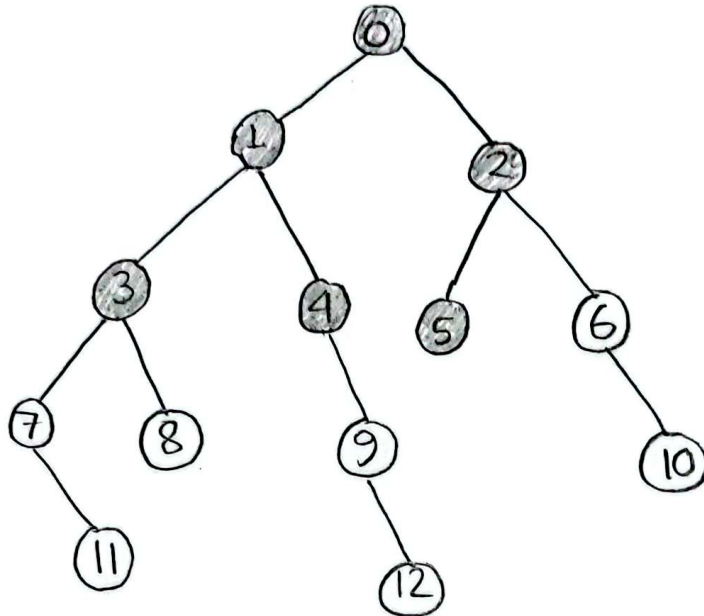
Sec: 06

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## Problem-1

Firstly, the simulation for the BFS algorithm is given below:



Source vertex is 0.

| Color      |
|------------|
| 0 = W B    |
| 1 = W G B  |
| 2 = W G B  |
| 3 = W G B  |
| 4 = W G B  |
| 5 = W G B  |
| 6 = W G B  |
| 7 = W G B  |
| 8 = W G B  |
| 9 = W G B  |
| 10 = W G B |
| 11 = W G B |
| 12 = W G B |

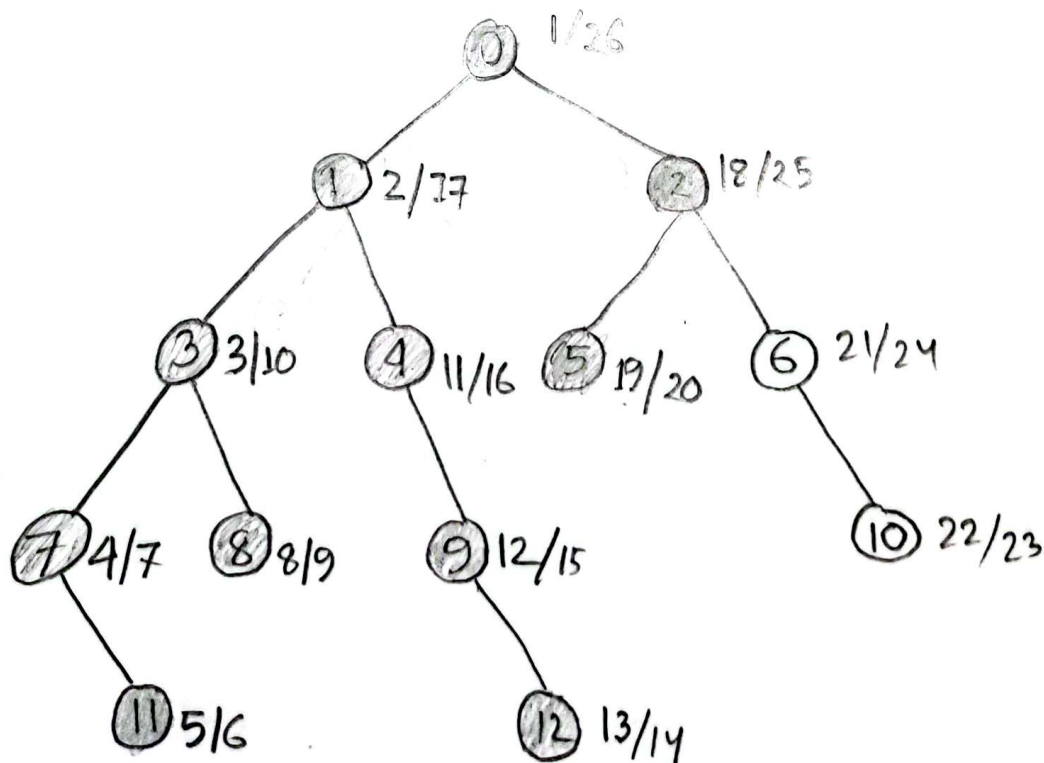
| vertex | parent | Distance |
|--------|--------|----------|
| 0      | None   | 0        |
| 1      | 0      | 1        |
| 2      | 0      | 1        |
| 3      | 1      | 2        |
| 4      | 1      | 2        |
| 5      | 2      | 2        |
| 6      | 2      | 2        |
| 7      | 3      | 3        |
| 8      | 3      | 3        |
| 9      | 4      | 3        |
| 10     | 6      | 3        |
| 11     | 7      | 4        |
| 12     | 9      | 4        |

| Queue |
|-------|
| 0     |
| 1     |
| 2     |
| 3     |
| 4     |
| 5     |
| 6     |
| 7     |
| 8     |
| 9     |
| 10    |
| 11    |
| 12    |

|                                    |                                |                                   |                                |                                    |                                    |
|------------------------------------|--------------------------------|-----------------------------------|--------------------------------|------------------------------------|------------------------------------|
| ①<br>$u = 0$<br>$v = 1$<br>$2$     | ②<br>$u = 1$<br>$v = 2$<br>$4$ | ③<br>$u = 2$<br>$v = 3$<br>$6$    | ④<br>$u = 3$<br>$v = 7$<br>$8$ | ⑤<br>$u = 4$<br>$v = 9$            | ⑥<br>$u = 5$<br>$v = \text{None}$  |
| ⑦<br>$u = 6$<br>$v = 10$           | ⑧<br>$u = 7$<br>$v = 11$       | ⑨<br>$u = 8$<br>$v = \text{None}$ | ⑩<br>$u = 9$<br>$v = 12$       | ⑪<br>$u = 10$<br>$v = \text{None}$ | ⑫<br>$u = 11$<br>$v = \text{None}$ |
| ⑬<br>$u = 12$<br>$v = \text{None}$ |                                |                                   |                                |                                    |                                    |

from the table, we can see that BFS visits 4 nodes (0, 1, 2, 3, 4). with source node, a total of five nodes are visited before visiting node 5.

Now, let's check the simulation for DFS,



However, from the DFS, we can see that, before visiting node 5, it already visits node 0, 1, 3, 4, 7, 8, 9, 11, 12, 2. Meaning, it visits a total of 10 nodes including source node 0. the sequence is,

$0 \rightarrow 1 \rightarrow 3 \rightarrow 7 \rightarrow 11 \rightarrow 8 \rightarrow 4 \rightarrow 9 \rightarrow 12 \rightarrow 2$

So, from both the simulation, we can conclude that BFS will visit the least number of nodes in compare to dfs before visiting node 5 in the given graph.