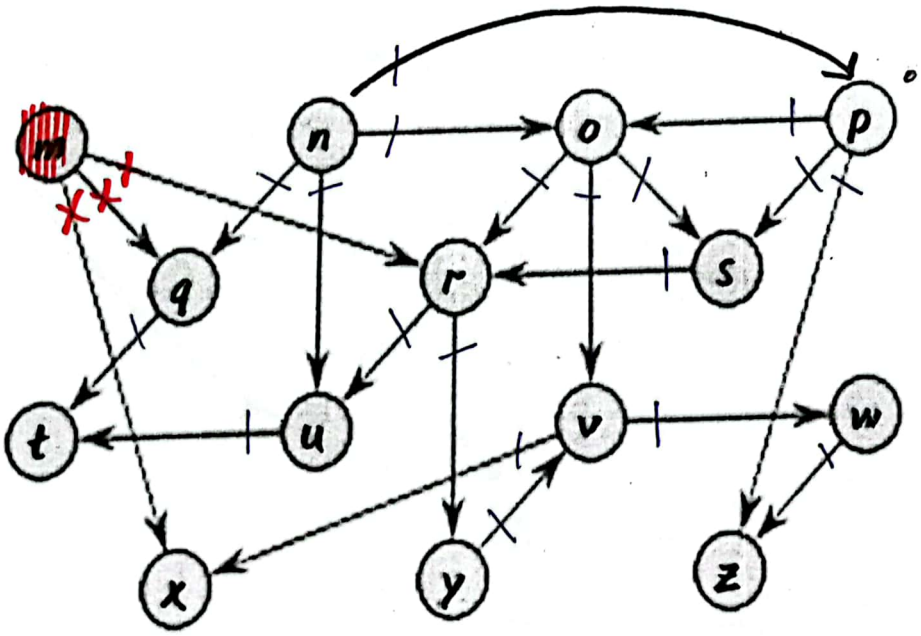
Quiz 5 AA S24 Solution

```
BFS(G, s)
 1  for each vertex u ∈ G.V − {s}
 2      u.color = WHITE
 3      u.d = ∞
 4      u.π = NIL
 5  s.color = GRAY
 6  s.d = 0
 7  s.π = NIL
 8  Q = ∅
 9  ENQUEUE(Q, s)
10  while Q ≠ ∅
11      u = DEQUEUE(Q)
12      for each v ∈ G.Adj[u]
13          if v.color == WHITE
14              v.color = GRAY
15              v.d = u.d + 1
16              v.π = u
17              ENQUEUE(Q, v)
18      u.color = BLACK
```

Apply BFS algorithm on the given graph and answer the following questions. The source node is '**n**'.
(**Note**: The adjacent nodes of a vertex are to be traversed in **alphabetical** order.)

1. Mark all the edges and draw the new graph with all the updated vertices and edges.
2. When **L13** is **executed** for the **12th time**, write vertices into two different sets, **Set1** [vertices available in the queue], & **Set2** [vertices dequeue from the queue] – vertex name ['**distance**', '**predecessor**' & '**color**']
3. Write value of u and the vertices available in the queue when **L11** is **executed** for 3rd, 5th, 7th time.
   Vertex name as u and queue condition at that time



→ AA Quiz 5 S24 Sol

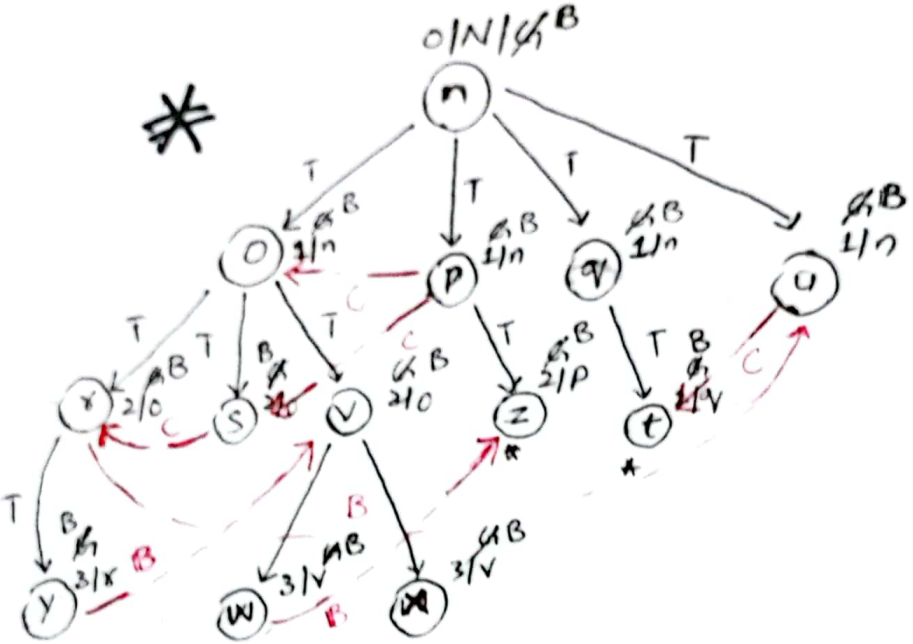
q = ② 2.13 → 12th. time final

n	o	p	q	u
o	1	1	1	1
N	n	n	n	n
B	B	B	B	G

x	s	v	z	t
2	2	2	2	2
0	0	0	p	q
G	G	G	G	G

↓ it was already G

table



m never comes into play

(4) n | o | p | q | u

(3) o | p | q | u | r | s | v

3rd (3) p | q | u | r | s | v | z

(1) q | u | r | s | v | z | t

5th (1) u | r | s | v | z | t

(2) r | s | v | z | t | y

7th (1) s | v | z | t | y — no vector added for s

(2) v | z | t | y | w | x

(0)* z | t | y | w | x

(0)* t | y | w | x

(1) y | w | x

(1) w | x

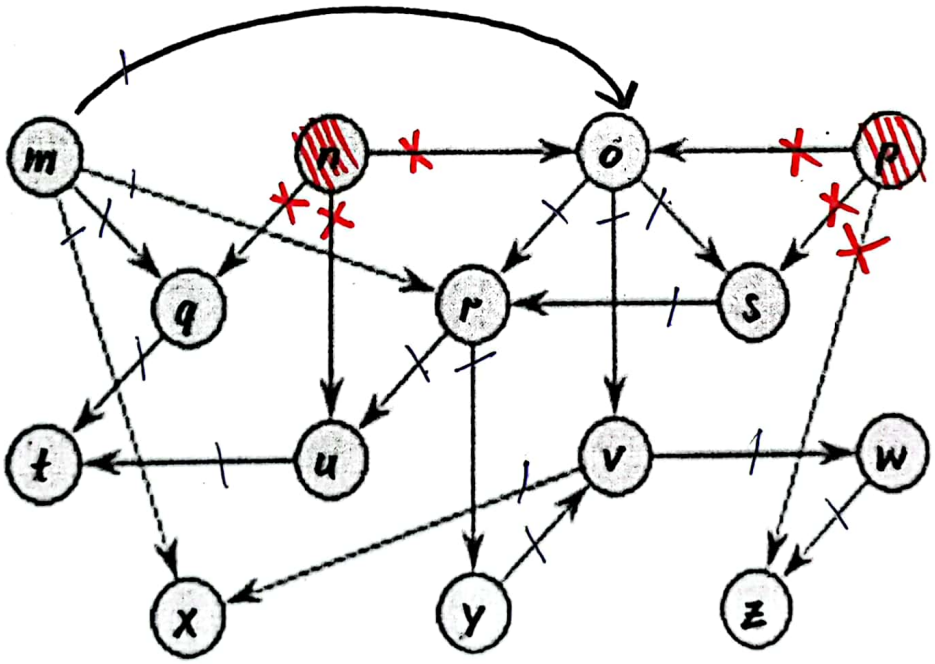
(0)* x | - - - -

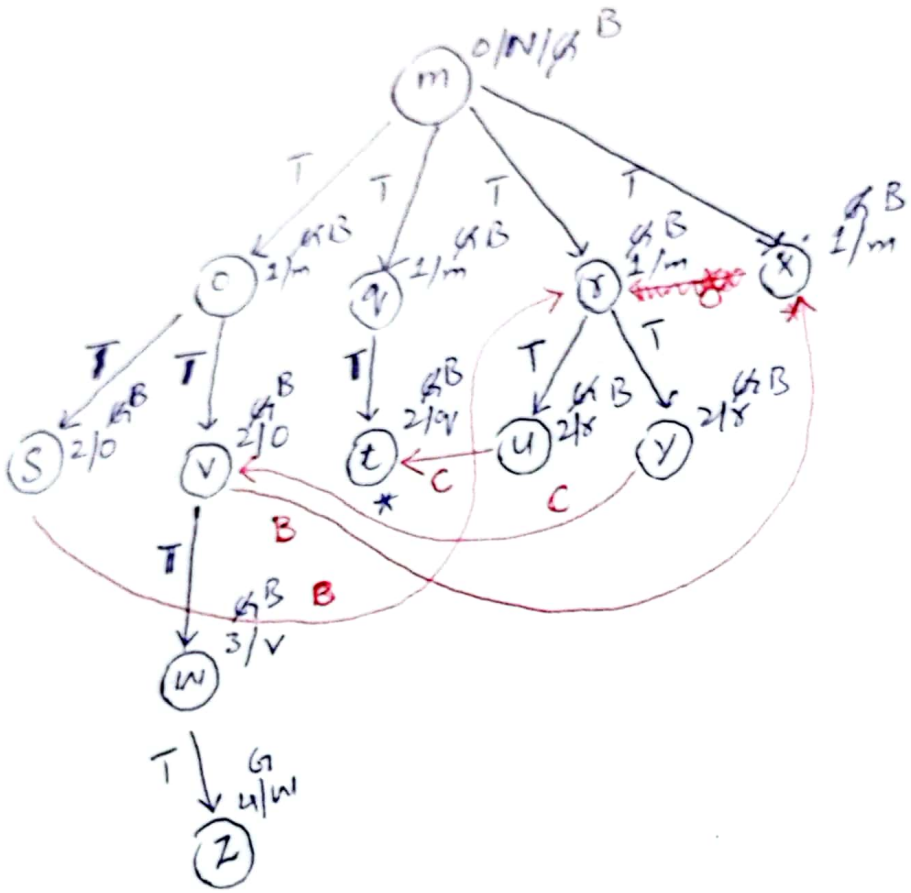
Q3 solution

```
BFS(G, s)
 1  for each vertex u ∈ G.V − {s}
 2      u.color = WHITE
 3      u.d = ∞
 4      u.π = NIL
 5  s.color = GRAY
 6  s.d = 0
 7  s.π = NIL
 8  Q = ∅
 9  ENQUEUE(Q, s)
10  while Q ≠ ∅
11      u = DEQUEUE(Q)
12      for each v ∈ G.Adj[u]
13          if v.color == WHITE
14              v.color = GRAY
15              v.d = u.d + 1
16              v.π = u
17              ENQUEUE(Q, v)
18      u.color = BLACK
```

Apply BFS algorithm on the given graph and answer the following questions. The source node is 'm'.
(**Note**: The adjacent nodes of a vertex are to be traversed in **alphabetical** order.)

1. Mark all the edges and draw the new graph with all the updated vertices and edges.
2. When **L13** is **executed** for the **12th time**, write vertices into two different sets, **Set1** [vertices available in the queue], & **Set2** [vertices dequeue from the queue] – vertex name [**'distance'**, **'predecessor'** & **'color'**]
3. Write value of u and the vertices available in the queue when **L11** is **executed** for 3rd, 5th, 7th time.
   Vertex name as u and queue condition at that time




m
0/N/∞ B
T
c
2/m ∞B
p
2/m ∞B
r
∞B 1/m
x
∞B 1/m
S
2/0 ∞B
v
∞B 2/0
t
∞B 2/q
u
∞B 2/r
y
∞B 2/r
C
C
B
B
∞B B
3/v
w
G
4/w
z

m	o	q	r	x	s	v
0	1	1	1	1	2	2
N	m	m	m	m	0	0
B	B	B	B	B	B	G (Not Black)

t	u	y
2	2	2
q	r	r
G	G	G (was already in queue).

⇒ P & n never discovered

(4) m | o | q | r | x |

(3) o | q | r | x | s | v |

3rd (1) q | r | x | s | v | t |

(2) r | x | s | v | t | u | y |

5th (0)* x | s | v | t | u | y |

(1) s | v | t | u | y |

7th (2) v | t | u | y | w |

*(0) t | u | y | w |

*(1) u | y | w |

(1) y | w |

(1) w | z |

*(0) z | ---- |

when 7th time

12th completed on x already in queue

```
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11      u = DEQUEUE(Q)
12      for each v ∈ G.Adj[u]
13          if v.color == WHITE
14              v.color = GRAY
15              v.d = u.d + 1
16              v.π = u
17              ENQUEUE(Q, v)
18      u.color = BLACK
```
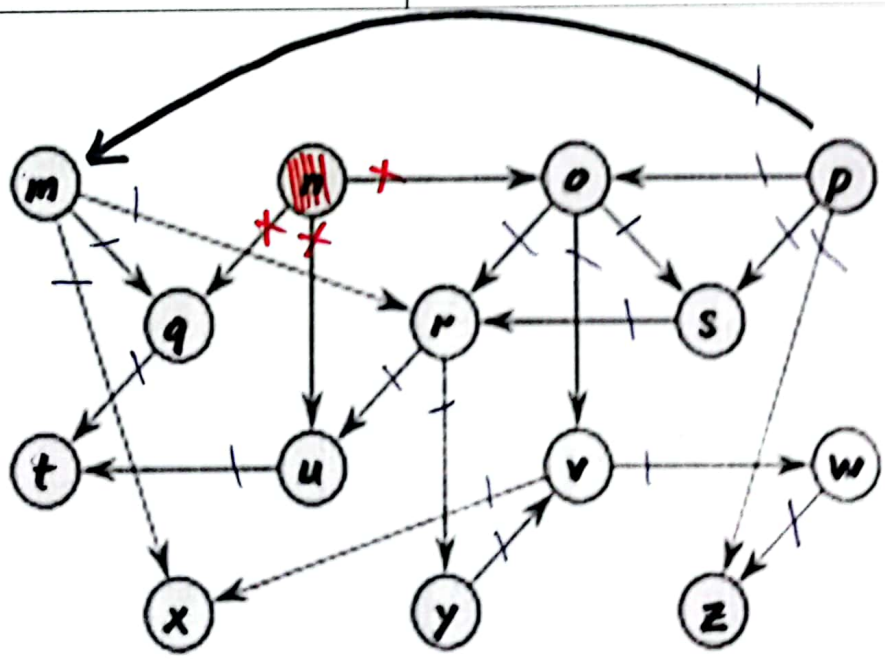
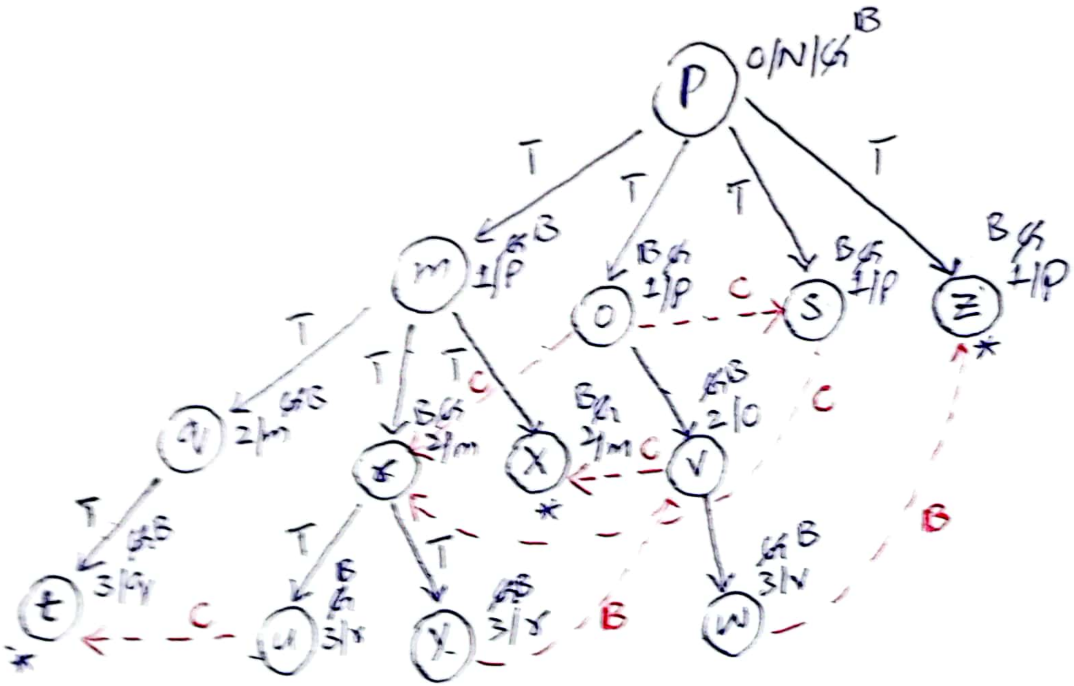

Apply BFS algorithm on the given graph and answer the following questions. The source node is '**p**'.
(**Note**: The adjacent nodes of a vertex are to be traversed in **alphabetical** order.)

1. Mark all the edges and draw the new graph with all the updated vertices and edges.
2. When **L13** is **executed** for the **12th time**, write vertices into two different sets, **Set1** [vertices available in the queue], & **Set2** [vertices dequeue from the queue] – vertex name ['**distance**', '**predecessor**' & '**color**']
3. Write value of u and the vertices available in the queue when **L11** is **executed** for 3rd, 5th, 7th time.
   Vertex name as u and queue condition at that time





P	m	O	S	Z	q
O	1	1	1	1	2
N	P	P	P	P	m
B	B	B	B	B	G

γ	X	V	t
2	2	2	α
m	m	O	N
G	G	G	W

new added
So no data update

n
never approached

7th call executed

(4) P | m | O | S | Z |

(3) m | O | S | Z | q | γ | X |

3rd (3) O | S | Z | q | γ | X | V |

(2) S | Z | q | γ | X | V |

5th (0)* Z | q | γ | X | V |

(1) q | γ | X | V | t |

7th (2) γ | X | V | t | u | y |

(0)* X | V | t | u | y |

(2) V | t | u | y | W |

(0)* t | u | y | W |

(1) u | y | W |

(1) y | W |

(1) W |

```
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1   for each vertex u ∈ G.V − {s}
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4       u.π = NIL
5   s.color = GRAY
6   s.d = 0
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8   Q = ∅
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11      u = DEQUEUE(Q)
12      for each v ∈ G.Adj[u]
13          if v.color == WHITE
14              v.color = GRAY
15              v.d = u.d + 1
16              v.π = u
17              ENQUEUE(Q, v)
18      u.color = BLACK
```

Apply BFS algorithm on the given graph and answer the following questions. The source node is 'o'.
(**Note:** The adjacent nodes of a vertex are to be traversed in **alphabetical** order.)

1. Mark all the edges and draw the new graph with all the updated vertices and edges.
2. When **L13 is executed** for the **12th time**, write vertices into two different sets, **Set1** [vertices available in the queue], & **Set2** [vertices dequeue from the queue] – vertex name ['**distance**', '**predecessor**' & '**color**']
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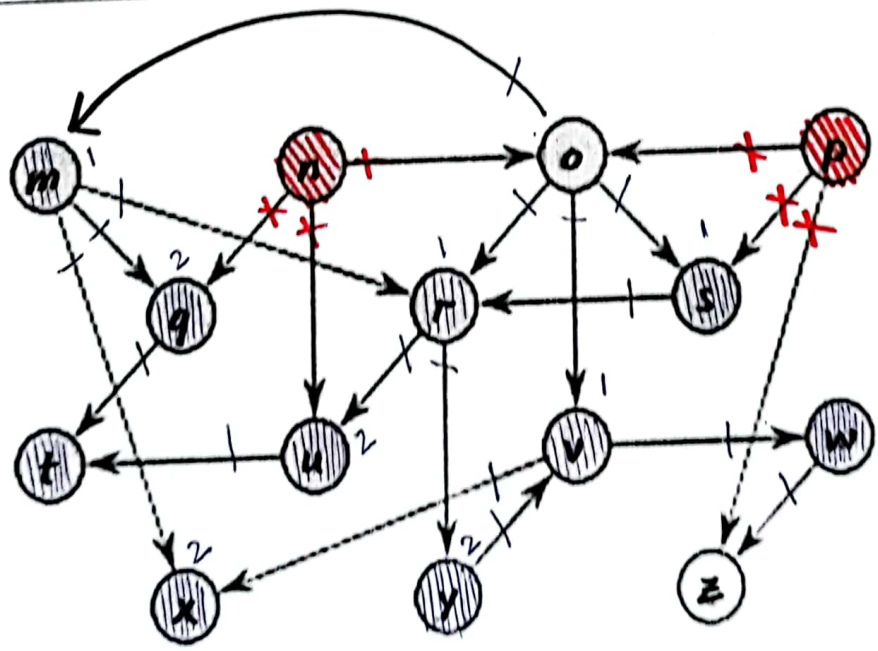

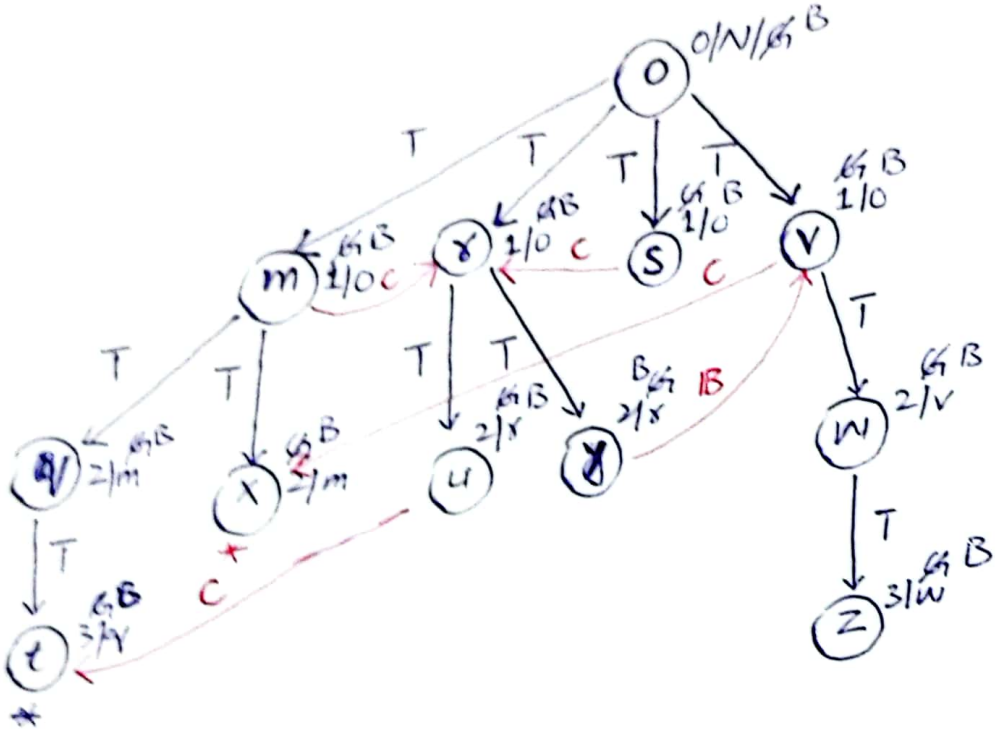
O
O/N/GB
T
T
T
T
m
GB
1/0 C
n
GB
1/0
C
S
GB
1/0
C
V
GB
1/0
T
T
T
T
T
q
GB
2/m
x
GB
2/m
u
GB
2/x
y
B GB
2/x
IB
W
GB
2/v
T
T
C
t
GB
3/v
Z
GB
3/w

O	m	r	s	v
0	1	1	1	1
N	0	0	0	0
B	B	B	B	G

q	x	u	y
2	2	2	2
m	m	r	r
G	G	G	G

(4) O | m | r | s | v |

(3) m | r | s | v | q | x |

[3rd] (2) r | s | v | q | x | u | y

(1) s | v | q | x | u | y

[5th] (2) v (G) | q | x | u | y | [illegible] || w (added after)

(1) q | x | u | y | w | t

[7th] *(0) x | u | y | w | t |

(1) u | y | w | t |

(1) y | w | t |

(1) w | t | z |

*(0) t | z |

*(0) z |

(P & n never visited)