



# 圖形理論 期中報告


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# 第一題 (a)

1. (a) Draw all trees of order 5.

①  two of vertices degree = 1,  
other vertices degree = 2.

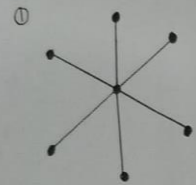
②  one of vertex degree = 3,  
three of vertex degree = 1,  
other vertex degree = 2.

③  one of vertex degree = 4,  
other vertices degree = 1.

11 trees of order 7 with  $\Delta(T) \geq 4$

# 第一題 (b)

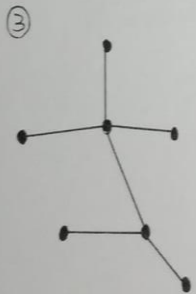
(b) Draw all trees of order 7 with  $\Delta(T) \geq 4$



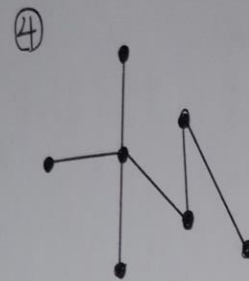
one of vertex degree = 6,  
six of vertices degree = 1.



degree = 5  $\Rightarrow$  one of vertex.  
degree = 2  $\Rightarrow$  one of vertex.  
degree = 1  $\Rightarrow$  five of vertices.

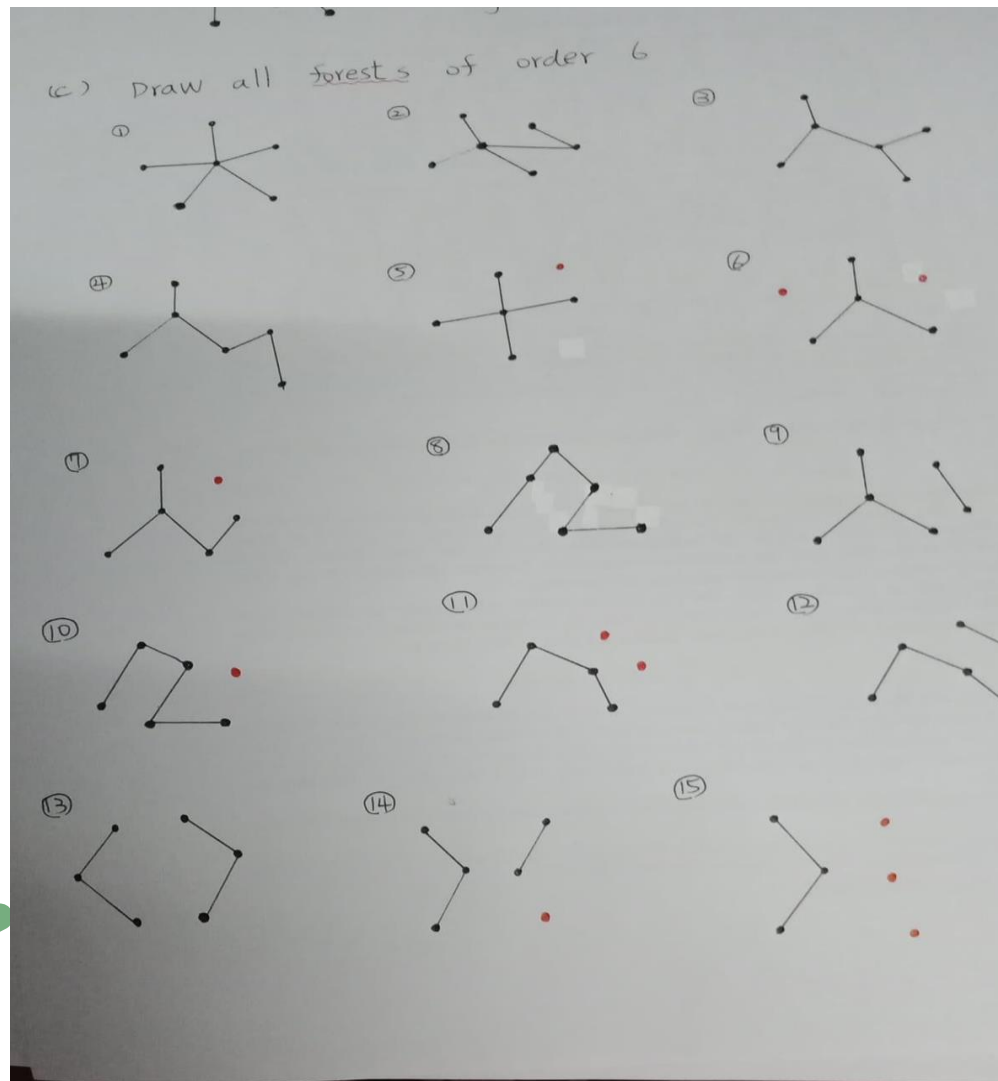


degree = 4  $\Rightarrow$  1 node  
degree = 3  $\Rightarrow$  1 node  
degree = 1  $\Rightarrow$  5 nodes.



degree = 4  $\Rightarrow$  1 node  
degree = 2  $\Rightarrow$  2 nodes  
degree = 1  $\Rightarrow$  4 nodes

# 第一題 (c)



## 第二題

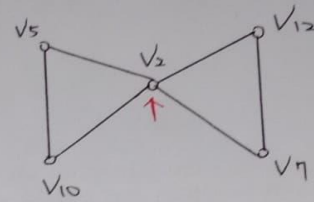
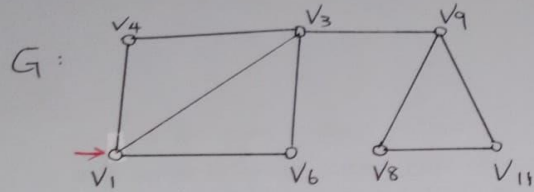
2. spanning tree  $\Rightarrow$  所有邊 - 會形成 circle 之邊.

$$8 \times 2 + 7 \times 2 + 6 \times 3 + 5 + 4 \times 2 + 3 = 64 \Rightarrow \text{總邊數}$$

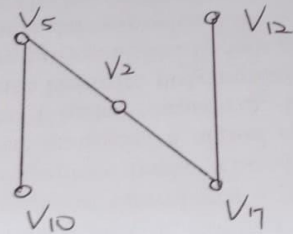
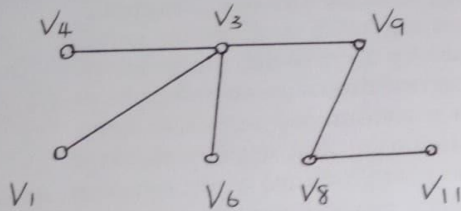
$$64 - 12 = 52 \quad \#$$

# 第三題

3. Find the (labeled) graph  $G$  shown below. find the Depth-First-Search forests

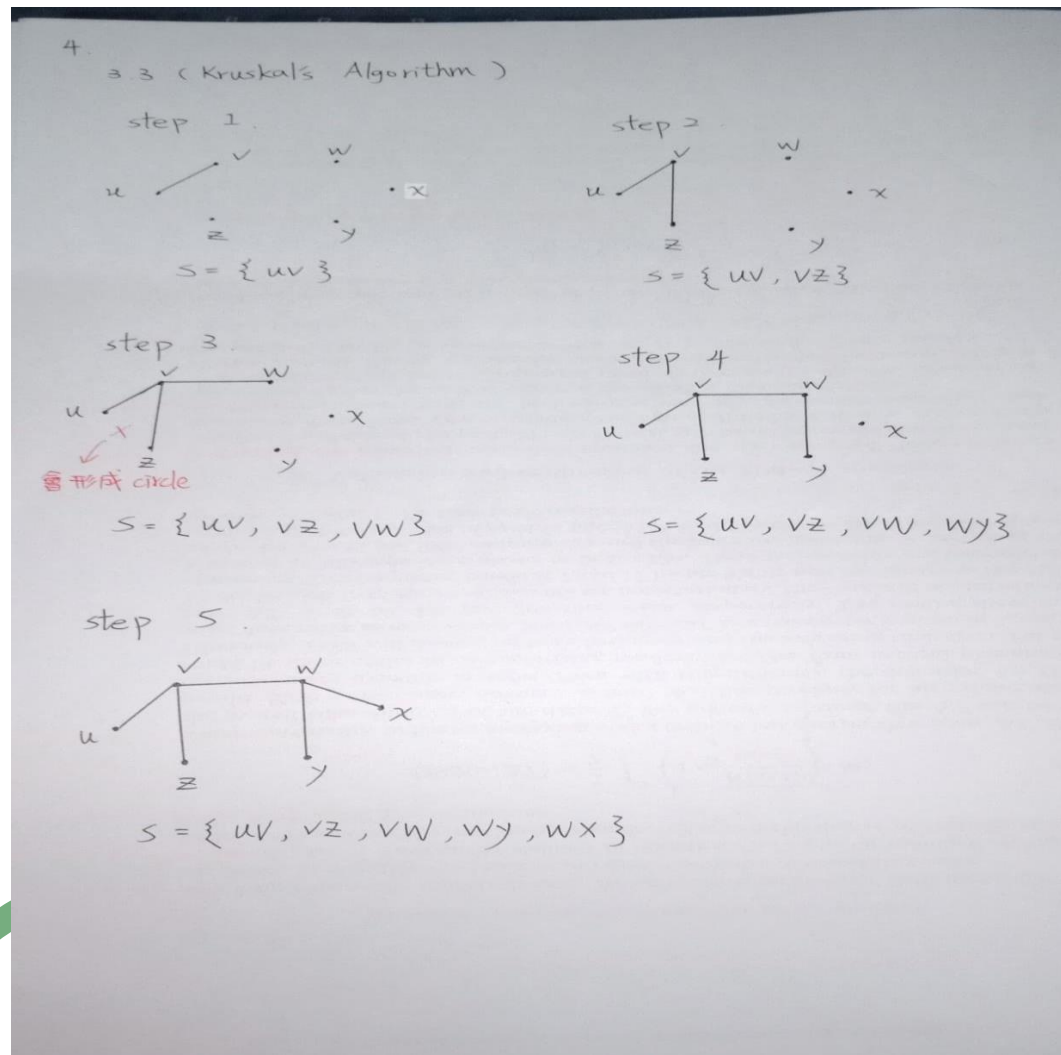


Depth-First-Search forest





# 第四題 – Kruskal's Algorithm



# 第四題 – Prim's Algorithm

3.4 (Prim's Algorithm)

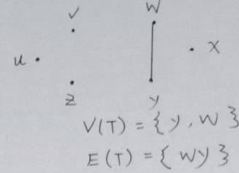
step 1

取  $y$  點為起始點

$$V(T) = \{y\}$$

step 2

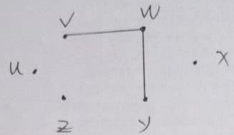
找最近的點



$$V(T) = \{y, w\}$$

$$E(T) = \{wy\}$$

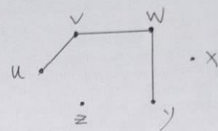
step 3



$$V(T) = \{y, w, u\}$$

$$E(T) = \{wy, uw\}$$

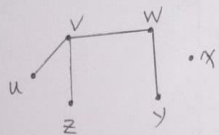
step 4



$$V(T) = \{y, w, u, z\}$$

$$E(T) = \{wy, uw, uz\}$$

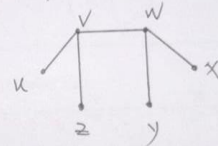
step 5



$$V(T) = \{y, w, u, z, x\}$$

$$E(T) = \{wy, uw, uz, xv\}$$

step 6

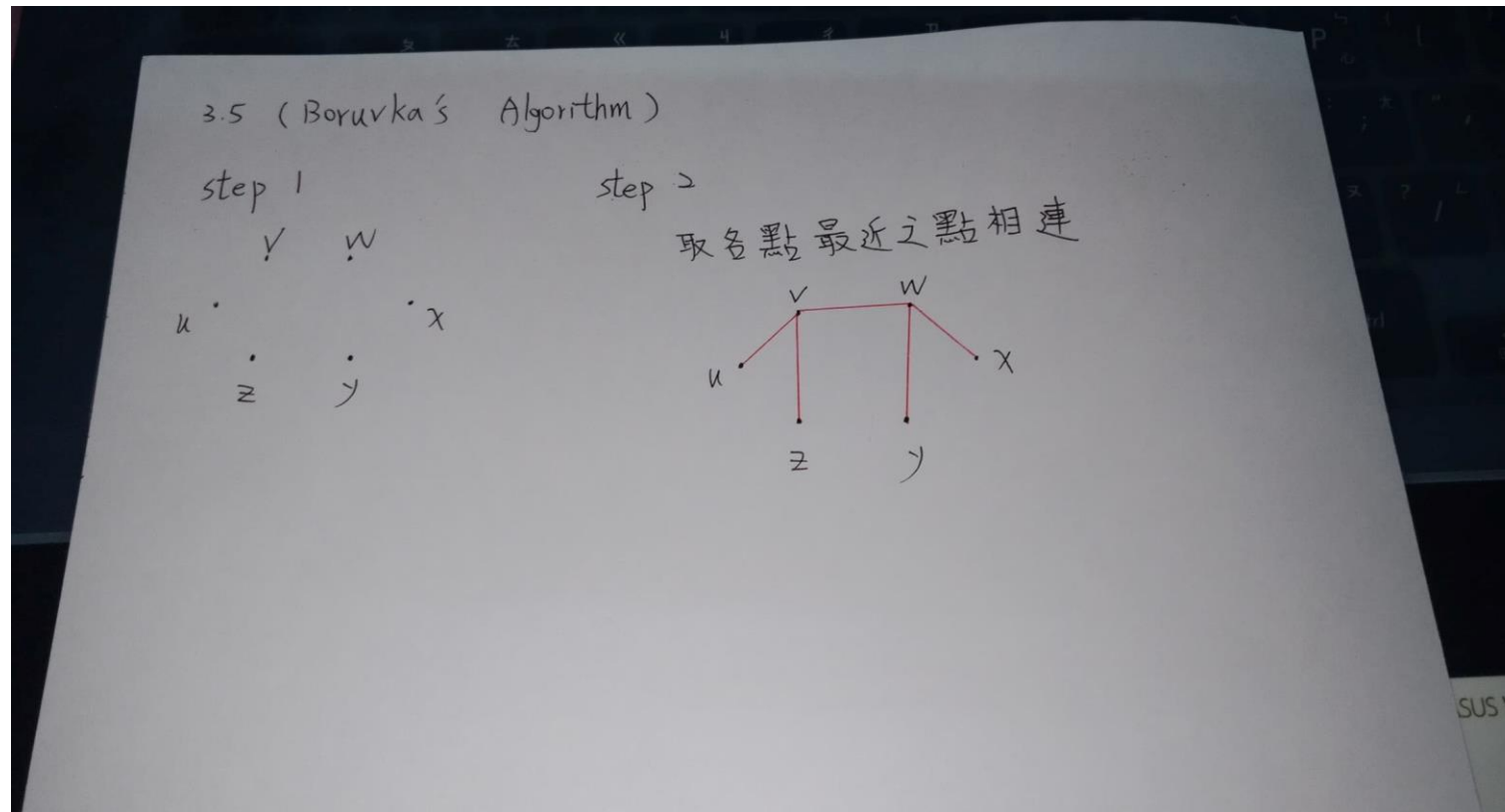


$$V(T) = \{y, w, u, z, x, v\}$$

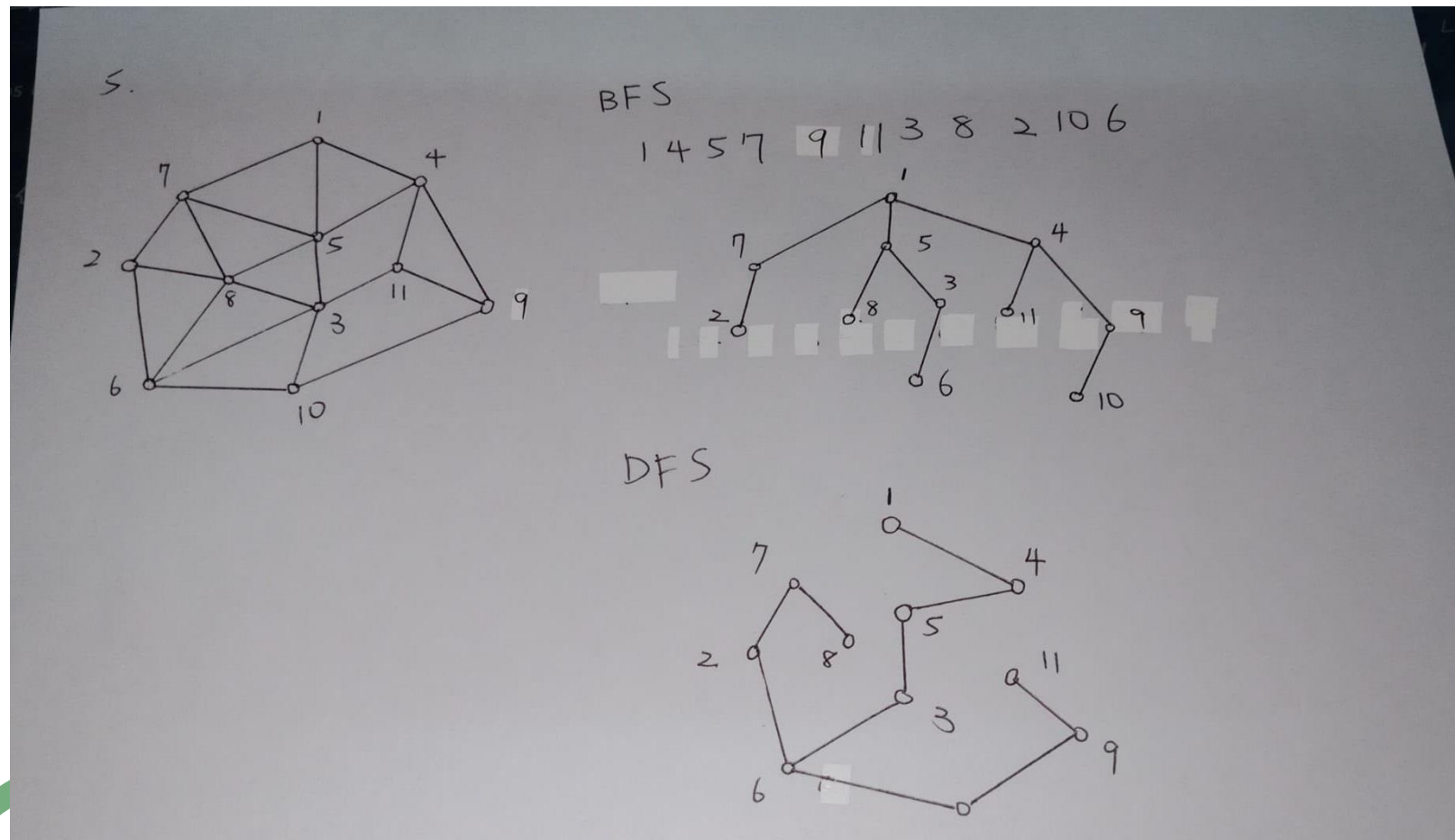
$$E(T) = \{wy, uw, uz, xv, vw\}$$



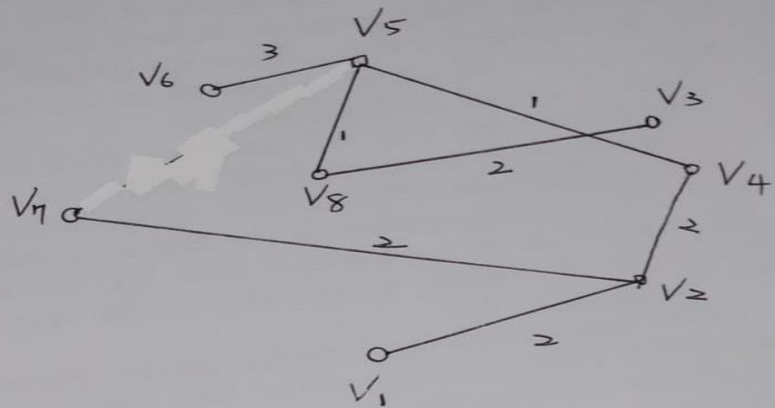
# 第四題 – Boruvka's Algorithm



# 第五題



## 第六題



$$w(T) = 2 + 2 + 2 + 2 + 1 + 1 + 3 = 13 \leq 13$$

(成立)