Problem 1

1. Step 1.

$A[x] \leftarrow 0$

pool, $X \leftarrow \{\}$, $B[v] \leftarrow \{\}$

Step 2

$X = \{v\} \{v\}$

pool $= \{(v,w), (v,u), (w,x)\}$

Finding greedy

length =

$A[v] + wt(v,w) = wb(v,w) = 3$

$A[v] + wt(v,x) = wt(v,x) = 2$

$A[v] + wt(v,u) = wt(v,u) = 1 \leftarrow$ Min.

$A[u] \leftarrow 1 ; B[u] = B[v] \cup \{(v,u)\} = \{(v,u)\}$

Add u to x, the pool

Step 3

$X = \{v, u\}$

pool $= \{(v,w), (v,x), (u,x), (u,w), (u,y)\}$

Calculating $\delta(v,w) = A[v] + wb(v,w) = 3$

greedy length, $\delta(v,x) = A[v] + wt(v,x) = 2 \leftarrow$ Min.

$\delta(u,x) = A[u] + wt(u,x) = 1+3 = 4$

$\delta(u,w) = A[u] + wt(u,w) = 1 + 4 = 5$

$\delta(u,y) = A[u] + wt(u,y) = 1 + 2 = 3$

$A[x] \leftarrow 2 , B[x] = B[v] \cup \{(v,x)\} = \{(v,x)\}$

Add x to X

$\checkmark$	$A[v]$
v	0
u	1
x	2
w	3
y	3

$\checkmark$	$B[v]$
v	$\{\}$
u	$\{(v,u)\}$
x	$\{(v,x)\}$
w	$\{(v,w)\}$
y	$\{(v,w),(u,y)\}$

Step 4

$X = \{v, u, x\}$

$pool = \{(x,y), (u,y), (v,w), (v,w)\}$

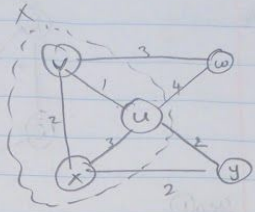$\delta(v,w) = 3$ ← Already calculated ← Min.

$\delta(u,y) = 3$

$\delta(u,w) = 5$

$\delta(v,w) = 3$

$\delta(x,y) = A[x] + wt(x,y) = 2 + 2 = 4$

$A[w] = 3$, $B[w] = B[v] \cup \{(v,w)\} = \{(v,w)\}$

Add w to X.
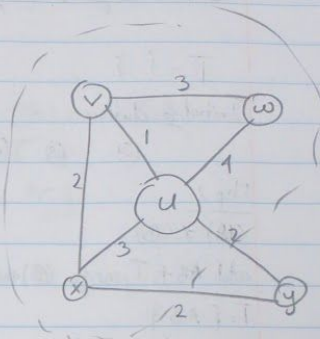

Step 5

$X = \{v, u, x, w\}$

$pool = \{(x,y), (u,y)\}$

$\delta(x,y) = 4$ → Already Calculated.

$\delta(u,y) = 3$ ← take this

$A[y] \rightarrow 3$, $B[y] = B[u] \cup \{(u,y)\} = \{(v,u), (u,y)\}$

Add y to X

$X = \{v, u, x, w, y\}$. Now $X = V$, hence loop breaks.

a) 3

b) $A = \{(v,0), (u,1), (x,2), (w,2), (y,3)\}$

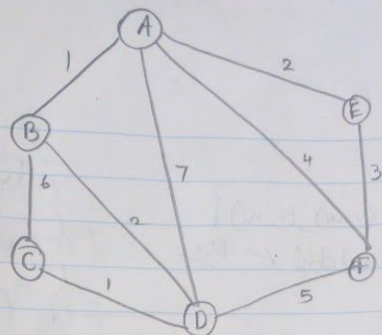c) $B = \{(v, \{\}), (u, \{(v,w)\}), (x, \{(v,x)\}), (w, \{(v,w)\}), (y, \{(v,u), (u,y)\})\}$

Problem 2
   a)

Problem 3

Problem 4

4. Sorting

Step ①

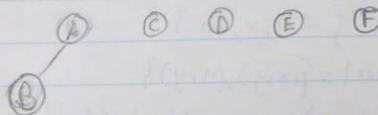Sorted edges: AB, CD, BD, AE, EF, AF, DF, AD

$T = \{ \}$

Initialize clusters.

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ

step 2

$C(A) \neq C(B)$

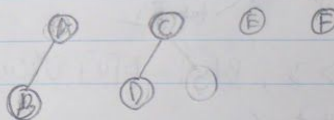add AB to T, merge C(A) and C(B)

$T = \{ AB \}$

Step 3

$C(C) \neq C(D)$

add CD to T, merge C(C) and C(D)
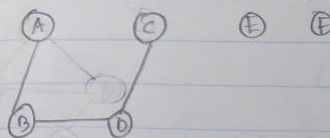
$T = \{ AB, CD \}$

Step 4

$C(B) \neq C(D)$

add BD to T, merge C(B) and C(D)

$T = \{ AB, CD, BD \}$

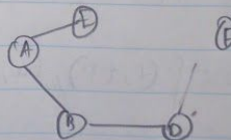## step 5

$C(A) \neq C(E)$

add AE to T, merge C(A) and C(E)
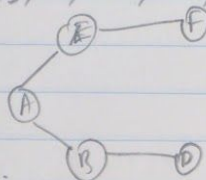
$T = \{ AB, CD, BD, AE$

step 6

$C(E) \neq C(F)$

add EF to T and merge $C(E)$ and $C(F)$

$\bar{T} = \{AB, CD, BD, AE, EF\}$

For steps;

step 7, step 8 and step 9

$C(B) == C(F)$ and $C(D) == C(F)$ and $C(A) == C(D)$

Do not add any of those edges to T.

But instead break loop when $i = \underline{n-1}$

return $\bar{T} = \{AB, CD, BD, AE, EF\}$