Disjoint Set

1.

	0	1	2	3	4	5	6	7	8	9
	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1

Union (0, 6)

	0	1	2	3	4	5	6	7	8	9
	6	-1	-1	-1	-1	-1	-2	-1	-1	-1

Union (6, 4) root(6) = 6 root(4) = 4 rank(6) > rank(4)

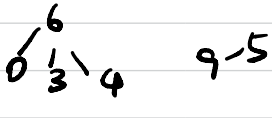
	0	1	2	3	4	5	6	7	8	9
	6	-1	-1	-1	6	-1	-2	-1	-1	-1

Union (9,5)

	0	1	2	3	4	5	6	7	8	9
	6	-1	-1	-1	6	-2	-2	-1	-1	5

Union (3,4) root(3) = 3 rank(3) = 1
root(4) = 6 rank(6) = 2

	0	1	2	3	4	5	6	7	8	9
	6	-1	-1	6	6	-2	-2	-1	-1	5



2. CreateSet(8)

-1	-1	-1	-1	-1	-1	-1	-1
0	1	2	3	4	5	6	7

Union (6, 3)

-1	-1	-1	-2	-1	-1	3	-1
0	1	2	3	4	5	6	7

Union (0, 2)

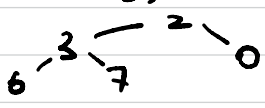
2	-1	-2	-2	-1	-1	3	-1
0	1	2	3	4	5	6	7

Union (7, 6) root(7) = 7 root(6) = 3 rank(7) < rank(3)

2	-1	-2	-2	-1	-1	3	3
0	1	2	3	4	5	6	7

Union (7, 2) root(7) = 3 root(2) = 2 rank(3) = rank(2)

2	-1	-3	2	-1	-1	3	3
0	1	2	3	4	5	6	7

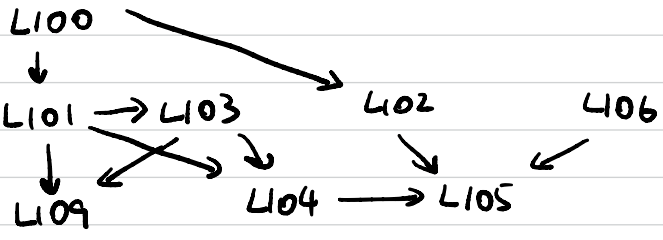


Union (1, 2) root(1) = 1 root(2) = 2 rank(1) < rank2

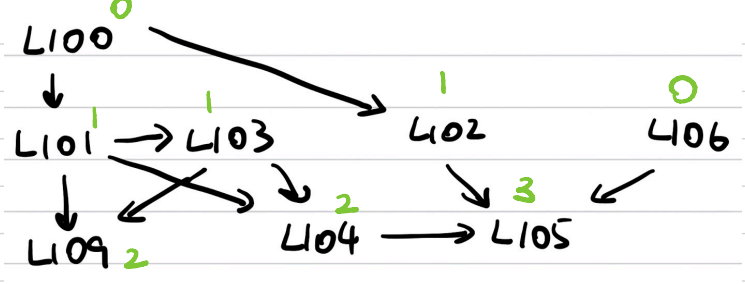
2	2	-3	2	-1	-1	3	3
0	1	2	3	4	5	6	7

Topo

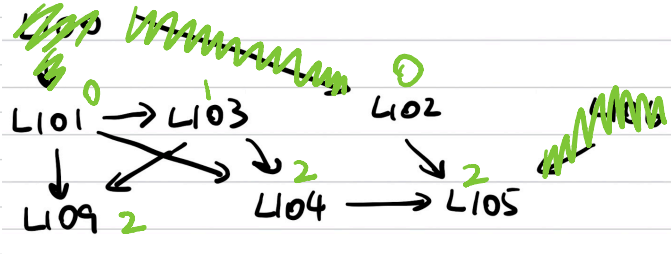
1. Class



w/ in degree

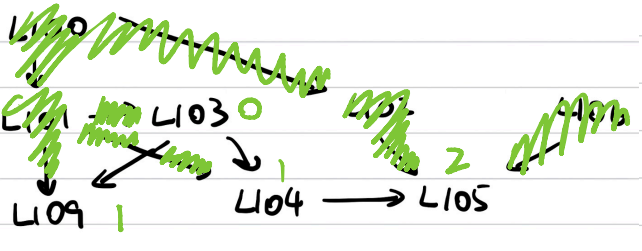


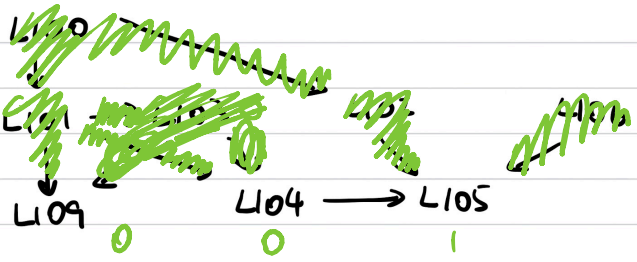
L100. L106



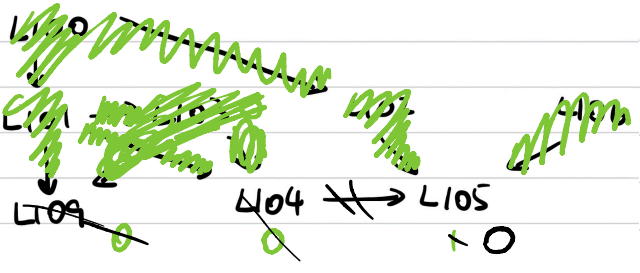
L100 L106

L101 L102



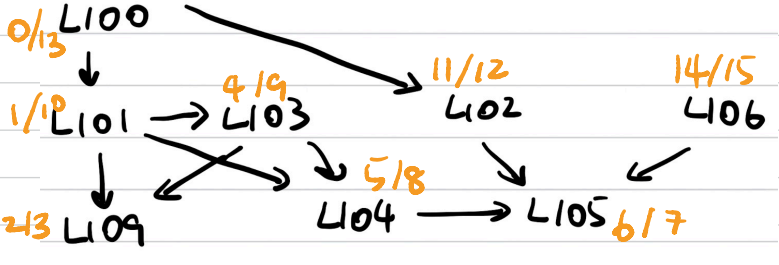


L100 L106
L101 L102
L103



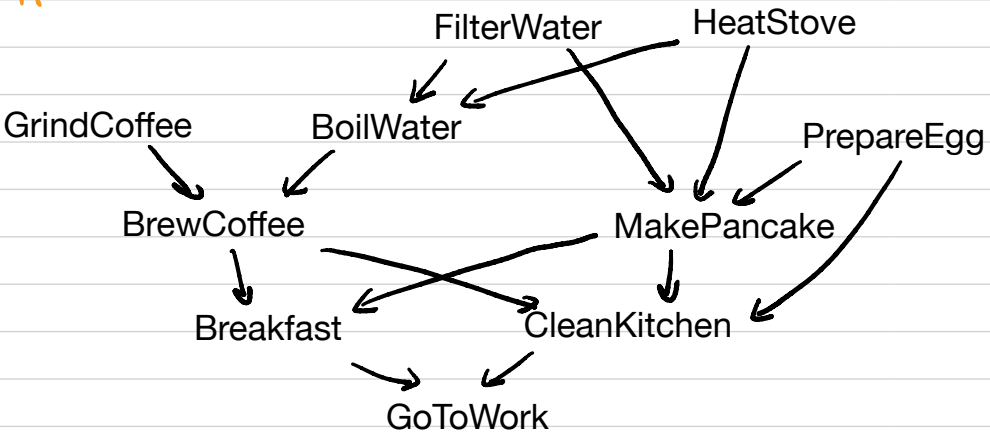
L100 L106
L101 L102
L103
L109 L104
L105

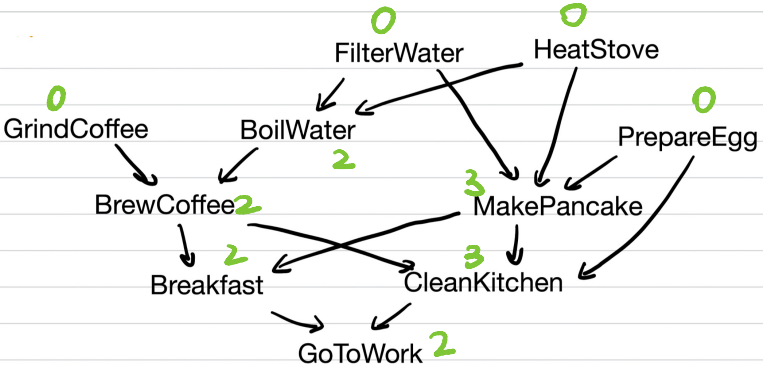
Finish time



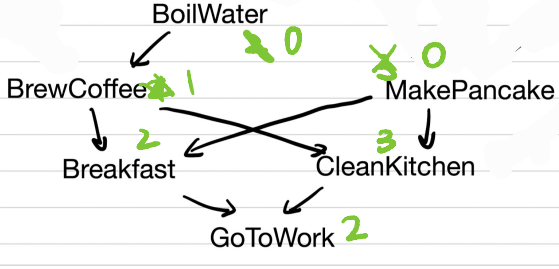
L106 L100 L102 L101 L103 L104 L105 L109

2. Coffee



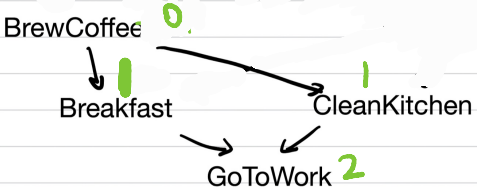


Grind, Filter, Heat, Egg



Grind, Filter, Heat, Egg

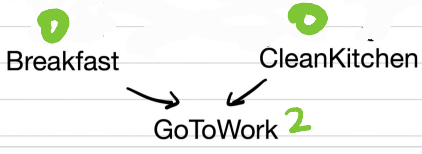
Boil, MakePancake



Grind, Filter, Heat, Egg

Boil, Make Pancake

Brew



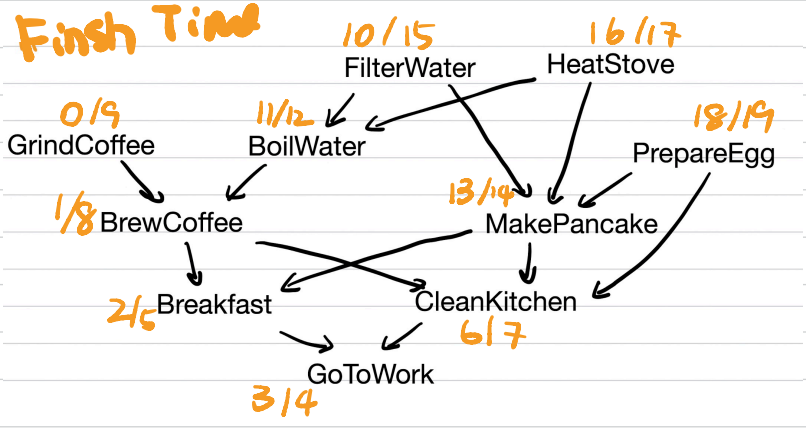
Grind, Filter, Heat, Egg

Boil, Make Pancake

Brew

Breakfast, Clean

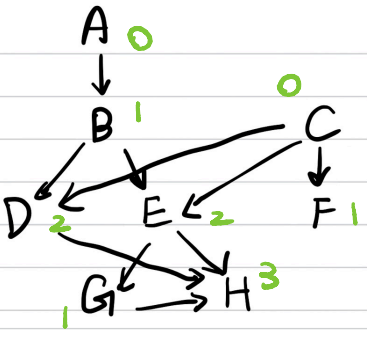
Go to Work



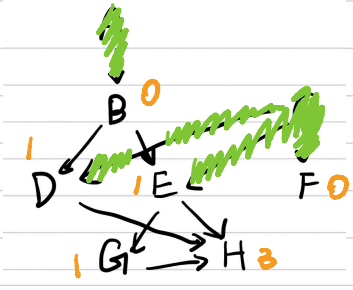
Egg, Heat Stove, Filter Water, Make Pancake, Boil Water

Grind Coffee, Brew, Clean kitchen, Breakfast, Work

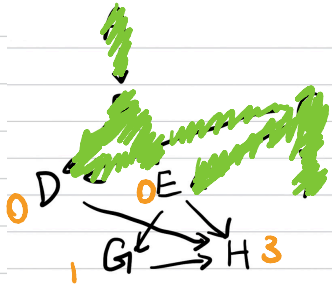
Graph. Indgree



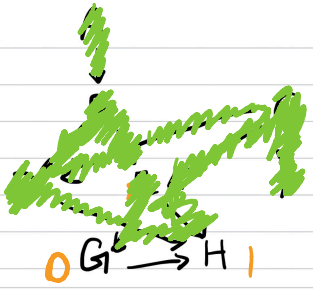
A, C.



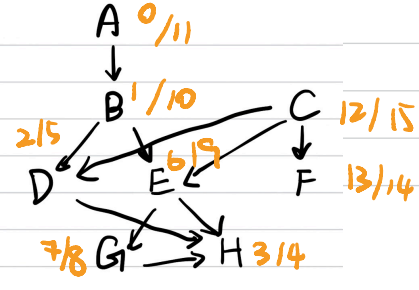
A C
B F



A. C
D E



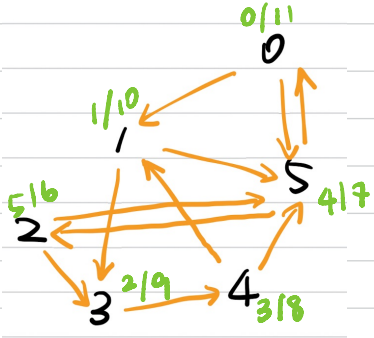
A. C
D E
G H

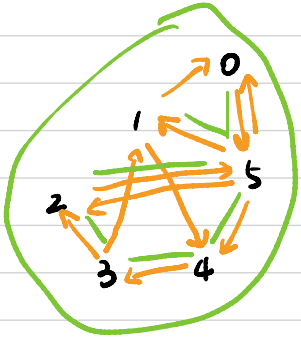


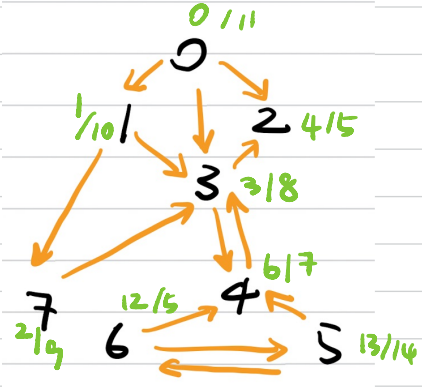
Finish time

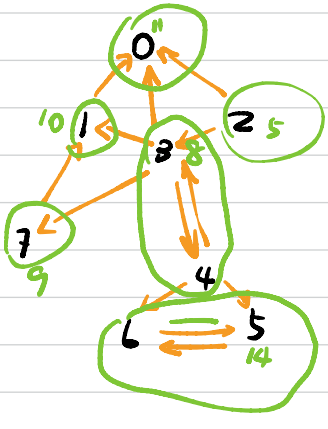
C F A B E D G H

Strongly Connect Component

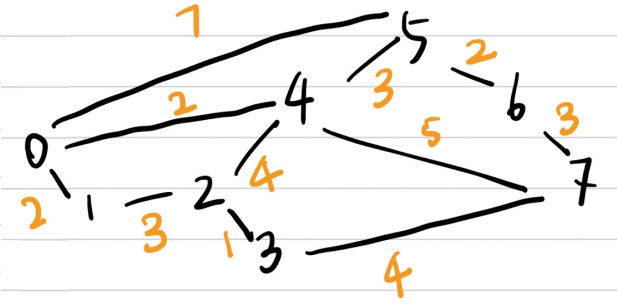








MST



Prim

	Cost	Parent	Flag
0	0	-1	T
1	2	0	F
2	∞	-1	F
3	∞	-1	F
4	2	0	F
5	7	0	F
6	∞	-1	F
7	∞	-1	F

→

	Cost	Parent	Flag
0	0	-1	T
1	2	0	T
2	3	1	F
3	∞	-1	F
4	2	0	F
5	7	0	F
6	∞	-1	F
7	∞	-1	F

	Cost	Parent	Flag
0	0	-1	T
1	2	0	T
2	3	1	F
3	∞	-1	F
4	2	0	T
5	3	4	F
6	∞	-1	F
7	5	4	F

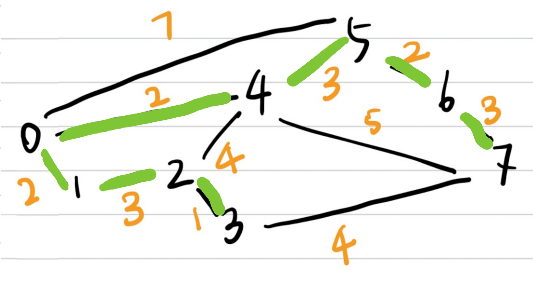
→

	Cost	Parent	Flag
0	0	-1	T
1	2	0	T
2	3	1	T
3	1	2	F
4	2	0	T
5	3	4	F
6	∞	-1	F
7	5	4	F

	Cost	Parent	Flag
0	0	-1	T
1	2	0	T
2	3	1	T
3	1	2	T
4	2	0	T
5	3	4	F
6	∞	-1	F
7	4	3	F

	Cost	Parent	Flag
0	0	-1	T
1	2	0	T
2	3	1	T
3	1	2	T
4	2	0	T
5	3	4	T
6	2	5	F
7	4	3	F

	Cost	Parent	Flag
0	0	-1	T
1	2	0	T
2	3	1	T
3	1	2	T
4	2	0	T
5	3	4	T
6	2	5	T
7	3	6	F → T



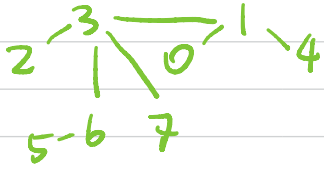
Cost :

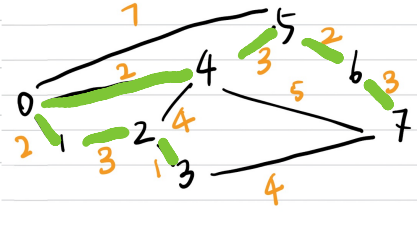
$2+3+1+2+3+2+3$

$= 16$

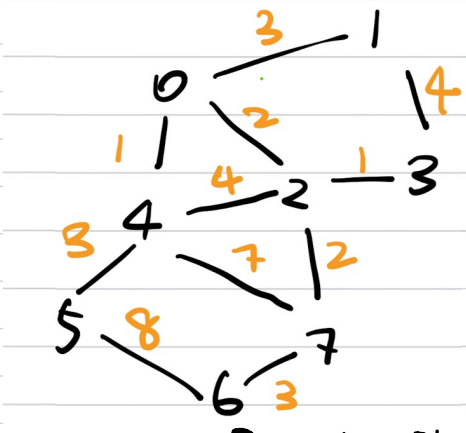
KRUSKAL

- ✓ 2-3 : 1
- ✓ 0-1 : 2
- ✓ 0-4 : 2
- ✓ 5-6 : 2
- ✓ 1-2 : 3
- ✓ 4-5 : 3
- ✓ 6-7 : 3
- 2-4 : 4
- 3-7 : 4
- 4-7 : 5
- 0-5 : 7





Prim



	Cost	Parent	Flag
0	0	-1	T
1	3	0	F
2	2	0	F
3	∞	-1	F
4	1	0	F
5	∞	-1	F
6	∞	-1	F
7	∞	-1	F

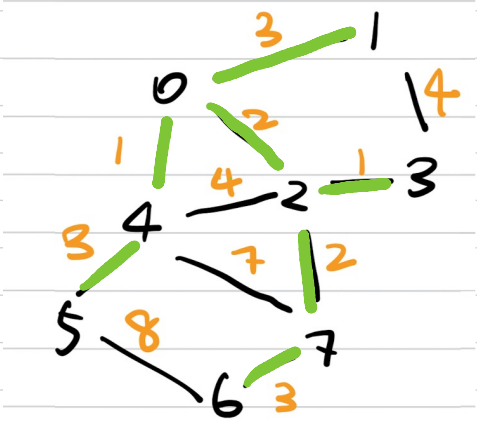
	Cost	Parent	Flag
0	0	-1	T
1	3	0	F
2	2	0	F
3	∞	-1	F
4	1	0	T
5	3	4	F
6	∞	-1	F
7	7	4	F

	Cost	Parent	Flag
0	0	-1	T
1	3	0	F
2	2	0	T
3	1	2	F
4	1	0	T
5	3	4	F
6	∞	-1	F
7	2	2	F

	Cost	Parent	Flag
0	0	-1	T
1	3	0	F
2	2	0	T
3	1	2	T
4	1	0	T
5	3	4	F
6	3	7	F
7	2	2	T

	Cost	Parent	Flag
0	0	-1	T
1	3	0	T
2	2	0	T
3	1	2	T
4	1	0	T
5	3	4	T
6	3	7	T
7	2	2	T

Total Cost 1+2+3+3+1+2+3 = 9



KRAUSKAL

- ✓ 0-4 : 1
- ✓ 2-3 : 1
- ✓ 0-2 : 2
- ✓ 2-7 : 2
- ✓ 0-1 : 3
- ✓ 4-5 : 3
- ✓ 6-7 : 3
- 2-4 : 4
- 1-3 : 4
- 4-7 : 7
- 5-6 : 8