Phang Teng Fone 1003296 HW1
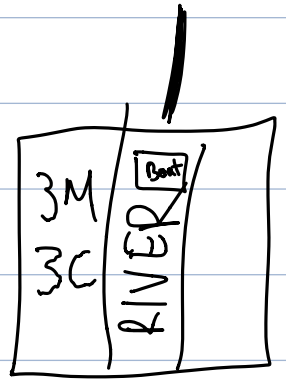
1. Let xM – number of Missionaries; yC – number of Cannibals. | denotes the side of the river.

State Space: All possible combination of nM and yC in the space of $\underline{nM|yC}$; $\underline{nMyC|}$; $\underline{|nMyC}$; $\underline{yC|nM}$. Constraint is that $nM \geq yC$ and | must exist.

m – missionaries
c – cannibals

Initial State: 3M3C |

Goal Test: | 3M3C

Actions : | 2M   or   2M |

| 2C   or   2C |

| 1M1C   or   1M1C |

| 1M   or   1M |

| 1C   or   1C |

Path Cost: Number of moves

2. a) Graph search has an explored set to keep track of nodes that had already been explored and visited while tree search can visit the same node multiple time.

b) A state is a physical configuration while a node is a data structure constituting part of a search tree (parent / child nodes / path cost etc)

c) A state, however, since a state is just a phsical configuration, it requires a node thus it becomes Node-State. The explored set is used to keep track of the states that have been visited.

3. a)

BFS (FIFO) Queue

Step	Frontier	Explored
1	A	—
2	AB, AC	A
3	AC, ABD	A, B
4	ABD	A, B, C
5	ABDX	A, B, C, D

∴ Solution is ABDX.

b)

DFS (FILO) Stack

Step	Frontier	Explored
1	A	—
2	AB, AC	A
3	AB, ACD	A, C
4	AB, ACDX	A, C, D

∴ Solution is ACDX

c) ABA, ABC, ACB

d) ACA, ACB, ACDB

4.   a)   BFS (FIFO) Queue

Step	Frontier	Explored
1	A	—
2	AB, AC	A
3	AC, ABD	AB
4	ABD, ACE, ACF	A B C
5.	ACE, ACF, ABDH, ABDX	ABCD

∴ Solution is <u>ABDX</u>.

b)   DFS (FILO) Stack

Step	Frontier	Explored
1	A	—
2	AB, AC	A
3	AB, ACE, ACF	AC
4.	AB, ACE, ACFI	ACF
5.	AB, ACE, ACFIH	ACFI
6.	AB, ACE, ACFIHD, ACFIHX	ACFIH

∴ Solution is <u>ACFIHX</u>.

5.
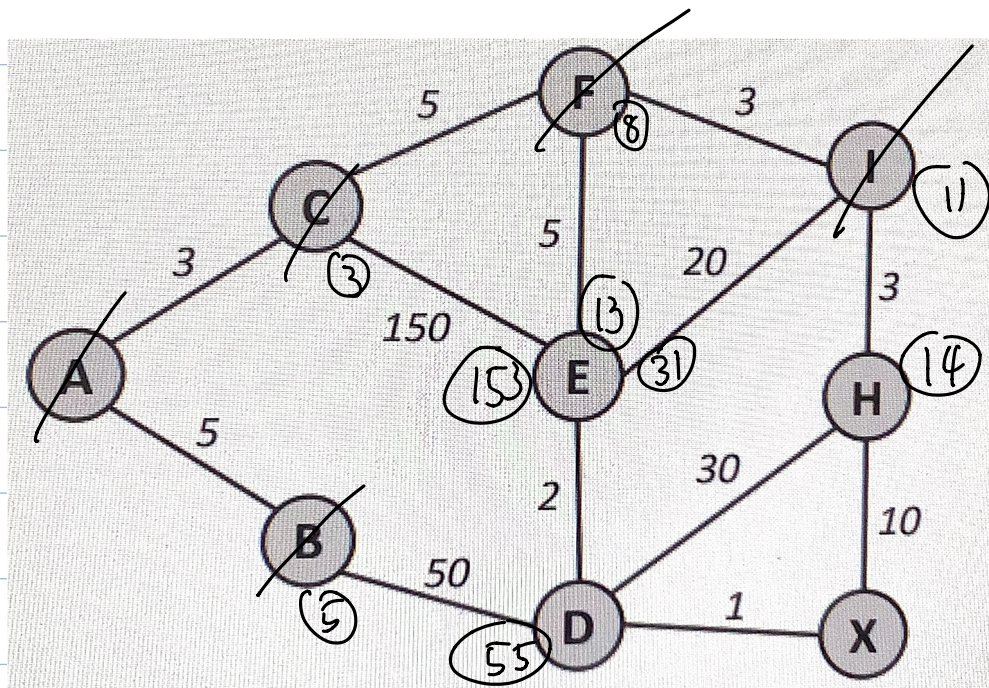
Step	Frontier	Explored
1	A(0)	—
2	A((3), AB(5)	A
3	AB (5), ACF (8), ACE (153)	A, C
4	ACF (8), ABD (55), ACE (153)	A, C, B
5	ACFI (11), ACFE (13), ABD(55)	A, C, B, F
6	ACFE (13), ACFIH(14), ABD (55)	A, C, B, F, I
7	ACFIH (14), ACFED (15)	A, C, B, F, I, E
8	ACFED (15), ACFIHX (24)	A, C, B, F, I, E, H
9	ACFEDX (16), ACFIHX (24)	A, C, B, F, I, E, H, D

∴ Solution is __ACFEDX__ with 16 cost.