Answer 1.

BFS – The sequence followed will be

A B C D E F

DFS – The sequence followed will be

A B D C E F

IDS – The sequence followed will be

A → A B C → A B D C E F

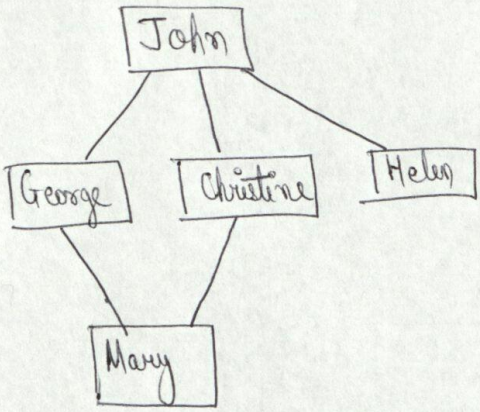
UCS – The sequence followed will be

A C B E F D

Answer 2

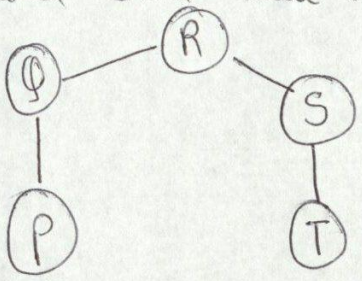
(1) BFS, UCS and IDS guarantee finding the correct number of degrees of separation between any two people in the graph.

(2) The first three levels are

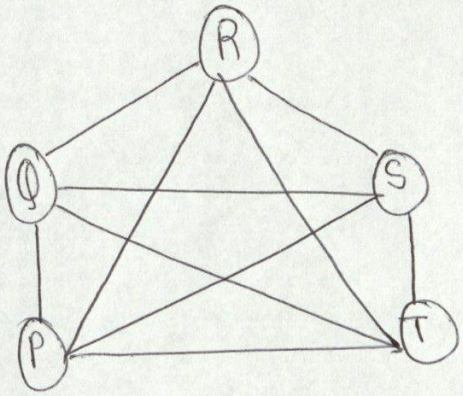


Since John is mapping to 3 other persons while George and Christine are mapped to one person only. Hence there is no one to one correspondance.

(3) Lets say we have five people P, Q, R, S, T
The required SNG will be as below. Here the nodes P and T have 4 degrees of separation between them.



(4) From above, lets say the people are P, Q, R, S, T.
The SNG will looke like below – Each node has 1 degree of separation between them



(5) We can use BFS to avoid exceeding 1GB. We can make a change to the algorithm to flush out nodes that form a loop by keeping track of visited nodes.

Answer 3

Heuristic 1

$h(A) = 5$
$h(B) = 30$
$h(C) = 20$
$h(D) = 0$
$h(E) = 10$
$h(F) = 0$

Modified Values

$h(A) = 5$
$h(B) = 30$
$h(C) = 9$ ← only modified value
$h(D) = 0$
$h(E) = 10$
$h(F) = 0$

Heuristic 2

$h(A) = 8$
$h(B) = 5$
$h(C) = 3$
$h(D) = 5$
$h(E) = 5$
$h(F) = 0$

Modified Values.

$h(A) = 8$
$h(B) = 5$
$h(C) = 3$
$h(D) = 0$ ← only modified value
$h(E) = 5$
$h(F) = 0$

Heuristic 3

$h(A) = 35$
$h(B) = 20$
$h(C) = 20$
$h(D) = 0$
$h(E) = 0$
$h(F) = 50$

Modified Values.

$h(A) = 35$
$h(B) = 20$
$h(C) = 9$
$h(D) = 0$
$h(E) = 0$
$h(F) = 39$

modified Values

Heuristic 4

$h(A) = 15$
$h(B) = 5$
$h(C) = 10$
$h(D) = 0$
$h(E) = 0$
$h(F) = 0$

Modified Values

$h(A) = 15$
$h(B) = 5$
$h(C) = 10$
$h(D) = 0$
$h(E) = 0$
$h(F) = 0$

No values modified

Heuristic 5

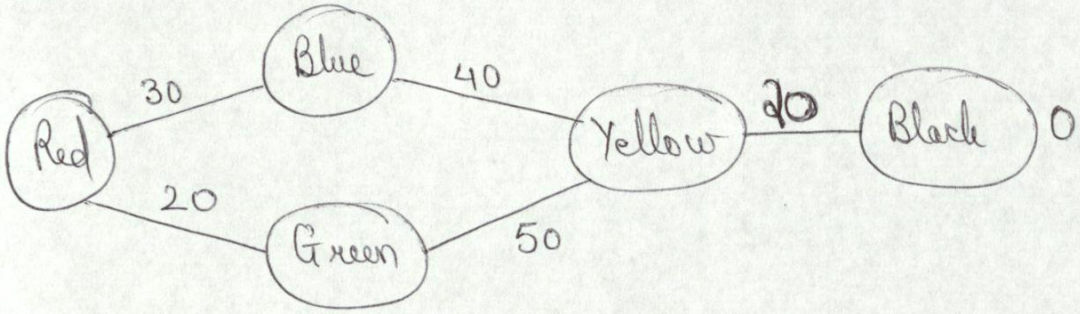
$h(A) = 0$
$h(B) = 0$
$h(C) = 0$
$h(D) = 0$
$h(E) = 0$
$h(F) = 0$

Modified Values

$h(A) = 0$
$h(B) = 0$
$h(C) = 0$
$h(D) = 0$
$h(E) = 0$
$h(F) = 0$

No values modified

Answer 4



lets say the length of path between yellow and black is 20

H(Red) = 55

H(Green) = 35

H(Blue) = 50

H(Yellow) = 10

H(Black) = 0

Answer 5

(a) Since each move needs 1KB of memory and the minimum moves needed are 100 so it is not possible to store all search nodes in 50 KB.

(b) The methods with linear space complexity can guarantee that we never need more than 1200 KB of memory. So Iterative deepening search, A* and IDA* can be used.