1

1.1 Each method carries 5 points.

BFS: A, EDCB, FEDC, GFED, HGFE, ZHGF
Path: A-E-Z

For DFS there are two possibilities:

DFS(1): A, EDCB, EDCF, EDCLI, EDCLG, EDCLJ, EDCLH, EDCLK, EDCLZ
Path: A-B-F-I-G-J-H-K-Z

DFS(2): A, EDCB, DCBZ
Path: A-E-Z

Greedy BFS: A, BCDE, CDEF, DEFG, HEFG, HFGZ
Path: A-E-Z

A*: A, BCDE, CDEF, DEFG, EFGH, ZFGH
Path: A-E-Z

1.2 7.5 points

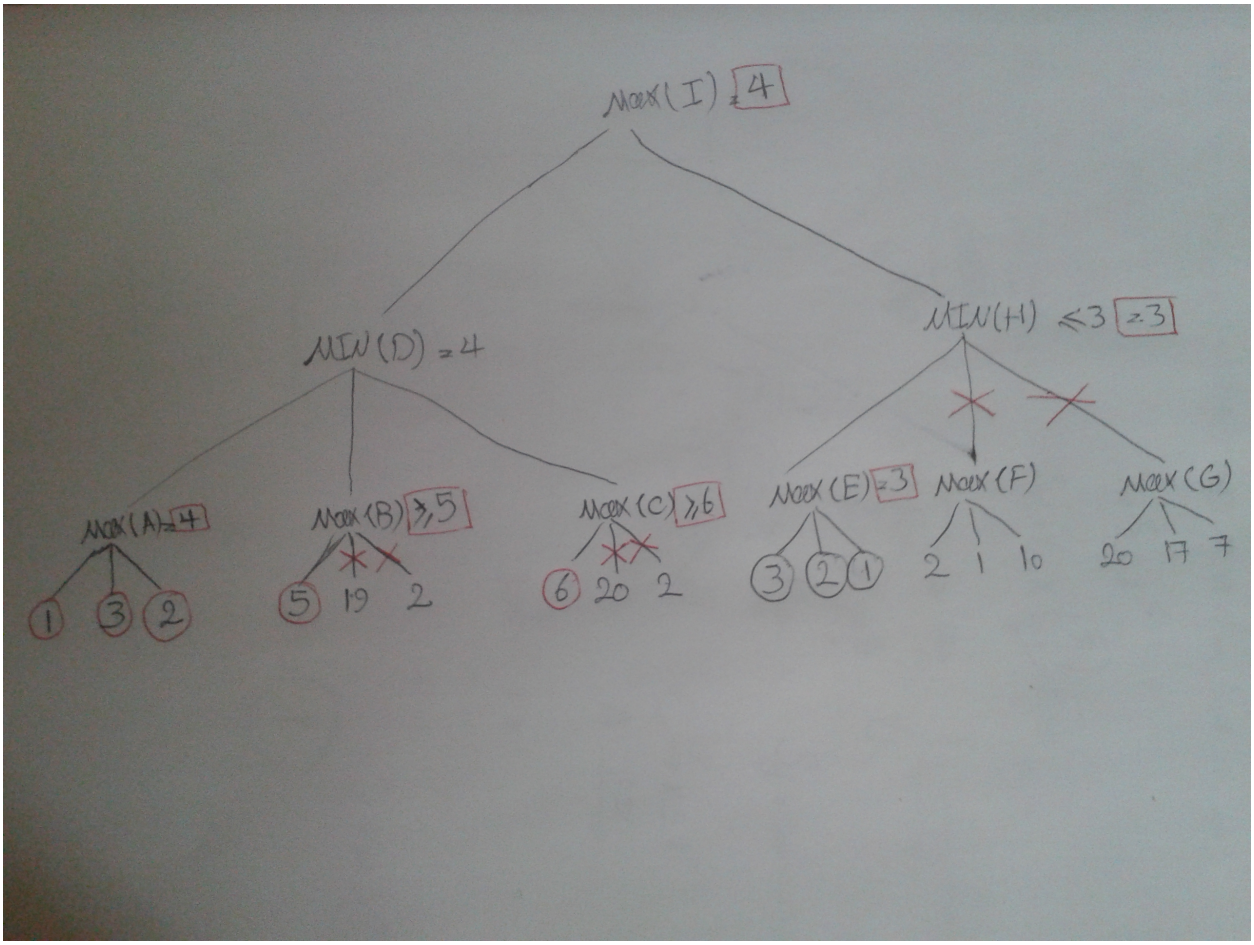
No, A*didn't find the optimal path because the heuristic function is not admissible and consistent. Other methods(BFS, DFS, GBFS) also didn't find optimal path.

1.3 2.5 points

Yes, All of them will find a solution. Only in the case if we have an infinity graph there is no answer for DFS.

2

2.1 15 points



2.2 5 points

It will select node D because its value is greater.

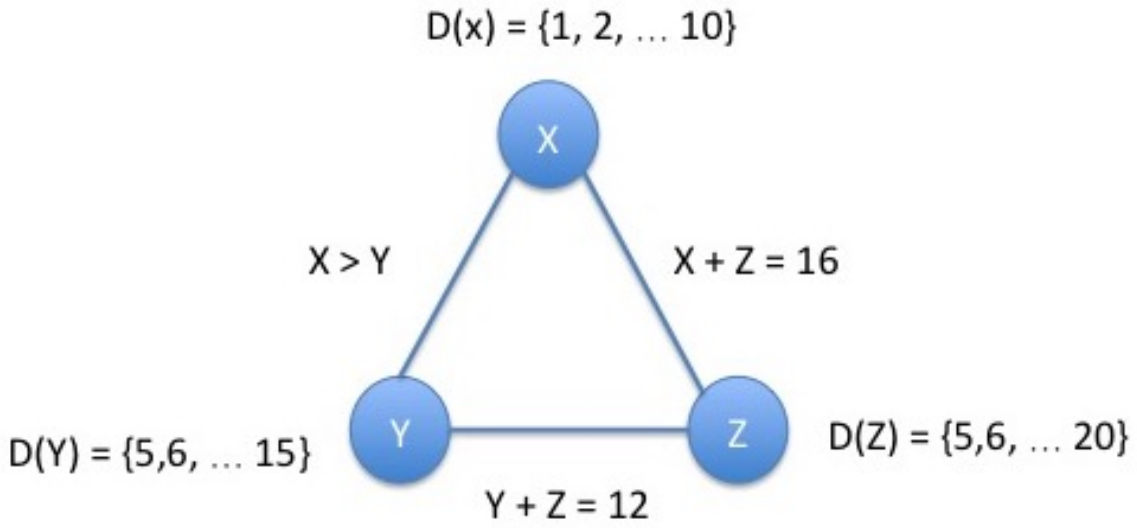
2.3 10 points

In this case the value for both D and H will be 20. So it doesn't matter to select either D or D.

3

3.1 10 points

the constraint graph can be found in figure below :



3.2 20 points

No, the constraints are not arc consistent. One example is sufficient to prove this claim. So, let us consider X=1, for which there exists no value in D(Y) such that C(X,Y) is satisfied. Further, applying arc consistency algorithm :

$$\begin{aligned} \textit{Applying}, \quad C(X,Y) : X > Y \\ D(X) : \{6,7,...10\}, \quad D(Y) = \{5,...9\} \end{aligned}$$

$$\begin{aligned} \textit{Applying}, \quad C(Y,Z) : Y + Z = 12 \\ D(Y) : \{5,...7\}, \quad D(Z) = \{5,...7\} \end{aligned}$$

$$\begin{aligned} \textit{Applying}, \quad C(X,Z) : X + Z = 16 \\ D(X) : \{9,10\}, \quad D(Z) = \{6,7\} \end{aligned}$$

$$\begin{aligned} \textit{Applying}, \quad C(Y,Z) : Y + Z = 12 \\ D(X) : \{5,6\}, \quad D(Y) = \{6,7\} \end{aligned}$$

So the final domains are,

$$D(X) = \{9, 10\}$$
$$D(Y) = \{5, 6\}$$
$$D(Z) = \{6, 7\}$$

4

4.1 5 + 5 Points

answer:
Most Constrained Variable: In the search tree, we alternate between choosing variables and choosing values for the variables. At the stage where we choose a variable, we break the search and backtrack if we find one variable that cannot be satisfied. Finding only one such variable is sufficient to say that something was wrong earlier, and we go up in the search to try other assignments. Therefore, we want to fail quickly, which will save us the trouble of trying many variables before finding the one that fails.

Least Constraining Value: Once we choose a variable, we have to try all the possible values before we can say that it failed. Therefore, we will be only losing time with values that fail (since we will still have to check the remaining values). But if we succeed, the search stops and we don't have the try the remaining values.