(i) two (ii) one

(1) `E H C A G F J D B I` (3) `EH, C, AFGJ, BDI`

Consider DFS traversal of a directed graph.
Define after(v) as the set of all vertices x with DFS(x) is called after DFS(v).

Observe (exercise: prove by induction):
in the DFS forest, a node w is a descendant of node v if and only if in the digraph, in the subgraph whose vertices are v and after(v), there is a dipath from v to w.

(i) DFS(y) is called after DFS(x), so y is in after(x). Also, there is a di-path (a single arc) from x to y. So, by the observation, in the DFS forest, y is in the subtree rooted at x. In postorder, all nodes of a subtree appear before the subtree root. So in postorder, y appears before x.

(ii) x is in after(y). The only nodes in after(y) that appear before y in postorder are the descendants of y. But x is not a descendant of y (otherwise, there is a di-path from x to y (by the observation), which with the arc from y to x forms a dicycle, contradiction (since the digraph is acyclic)).

(iii) Let z be the last vertex in postorder. By (i) and (ii), there is no arc from a vertex to z. So z is a source.

$\Theta(n + \sum_v \text{degree}(v)) \ = \ \Theta(n + m)$.

The for loop iterates exactly n^2 times, so $\Theta(n^2)$.

```
def transpose(G):
  T = []
  for v in range(n(G)):
    nbrVec = []
    for w in range(n(G)):
      nbrVec.append(G[w][v])
    T.append(nbrVec)
  return T
```