(i) In an undirected graph, the sum (over all vertices) of the degree of each vertex equals _____ times the number of edges.

(ii) In a directed graph, the sum (over all vertices) of the out-degree of each vertex equals _____ times the number of arcs.

Draw the digraph below. Then trace the scc algorithm on it: (1) list vertices in reverse postorder of the transpose (2) using the order from (1), draw the dfs traversal forest (3) list the sc components.

```
A: F,J        B: D        C: E        D: G,I
E: H          F: G        G: A,H      H: E
I: B,C,F      J: C,F
```

Claim: the last vertex in postorder of an acyclic digraph A is a source.

(i) Assume that (x,y) is an arc of A. Assume dfs(x) is called before dfs(y). Prove that y occurs before x in postorder.

(ii) Repeat (i) if dfs(y) is called before dfs(x).

(iii) Using (i) and (ii), prove the claim.

Give the runtime:

```
def transpose(G):
  T = {}
  for v in G: T[v] = []
  for v in G:
    for w in G[v]: T[w].append(v)
  return T
```

Complete, and give the runtime:

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

      _____
    T.append(nbrVec)
  return T
```