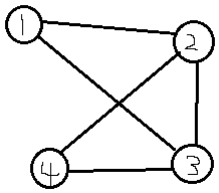
1.

a)




b) D(G)=

$$\begin{bmatrix} 2000 \\ 0300 \\ 0030 \\ 0002 \end{bmatrix}$$

L(G)=A(G)-D(G)=

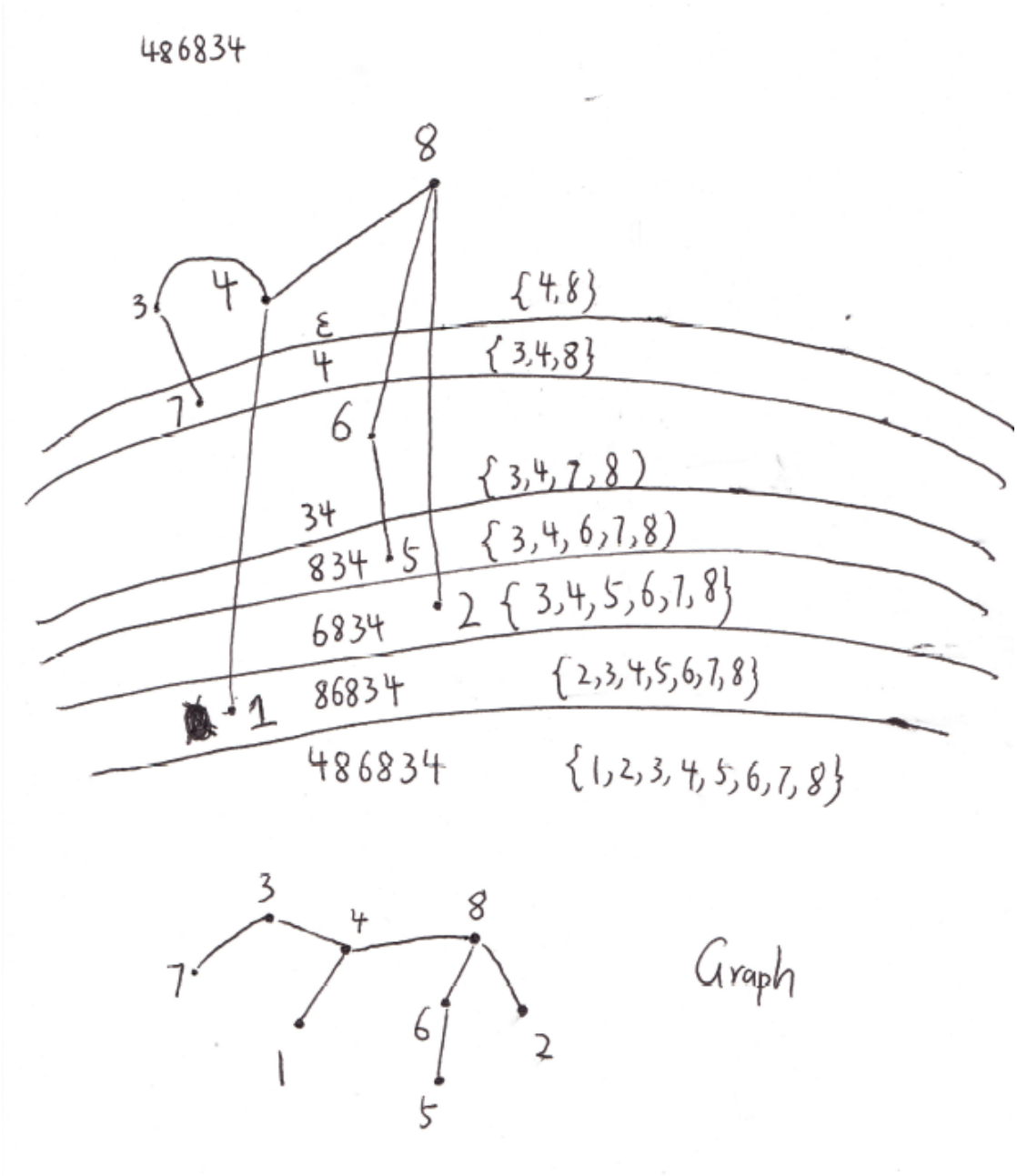
$$\begin{bmatrix} 2 & -1 & -1 & 0 \\ -1 & 3 & -1 & -1 \\ -1 & -1 & 3 & -1 \\ 0 & -1 & -1 & 2 \end{bmatrix}$$

c) According to (Kirchoff s Matrix Tree Theorem),number of labeled spanning trees of G is det L':

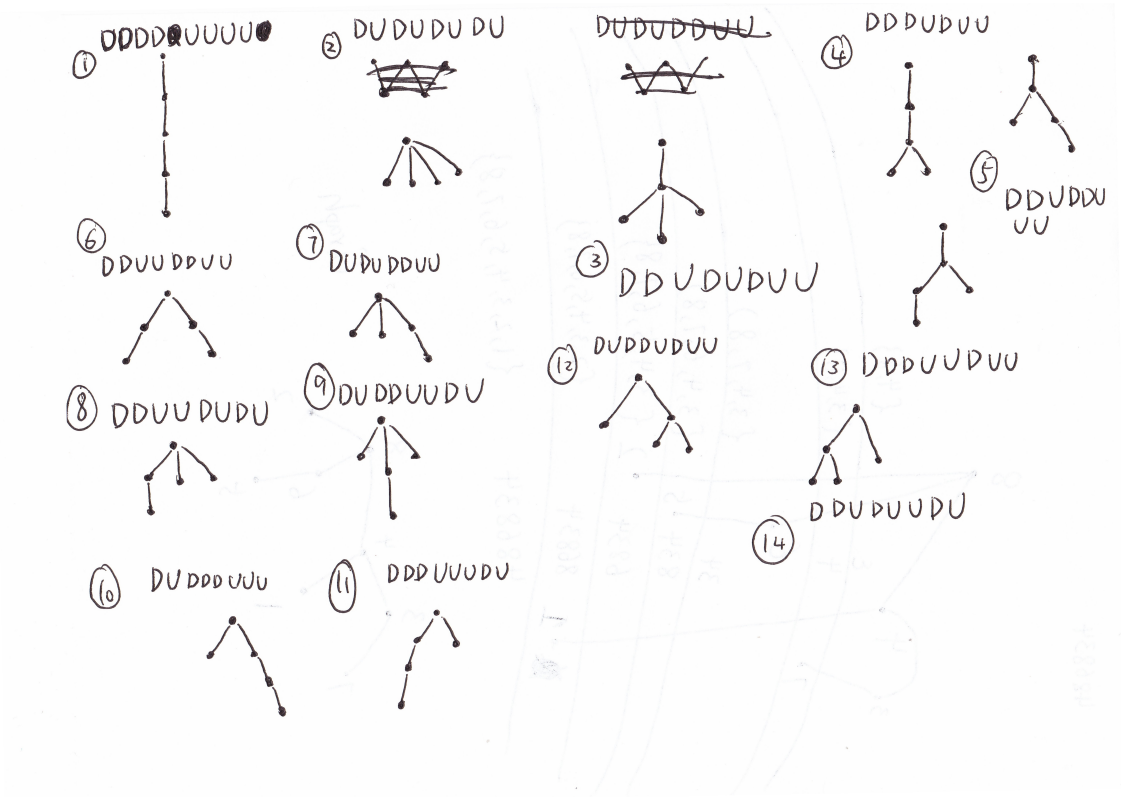
$$det \begin{bmatrix} 3 & -1 & -1 \\ -1 & 3 & -1 \\ -1 & -1 & 2 \end{bmatrix} = 8$$

So there are 8 labelled different spanning tree.

2.




3.
Draw all these trees:




According to formula:

$$C(n) = \frac{1}{n+1} * C(2n, n) = \frac{1}{5} * C(8, 4) = 14$$

and we know that each traversal is unique for one tree. So this means we have successfully draw all 4-edges tree.