1. $n=1$ trivial.

Suppose inductively that result is true for $i<n$.

Let T be a tree w/ n vertices.

remove an edge, $n_1+n_2=n$

$(n_1-1)+(n_2-1)+1=n-1$ edges

if G is bipartite, then from any $v \in A$ to traverse back to itself, it needs to walk to B, then A. $\therefore$ even

if G has all even cycles, then we can

trivial on tree $v=v$

$e=v-1$

$f=1$

$v-(v-1)+1=2$

assume $e \geq v$ and works for all e

no bridge since not a tree, then if we remove such edge

$v-(e-1)+(f-1)=2$

$v-e+1+f-1=2$

$v-e+f=2$

if $|V| = 0$, trivial

let $\deg(V) \leq 5$

inductively, $G - v$ has 6-coloring.

This gives valid coloring of all vertices except v in G with 6 colours.

We know that $k|A| = k|B|$

$|A| = |B|$

let $D \subseteq A$

$$\sum_{v \in N(D)} \deg(v) = k|N(D)|$$