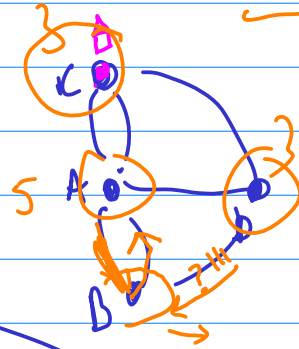
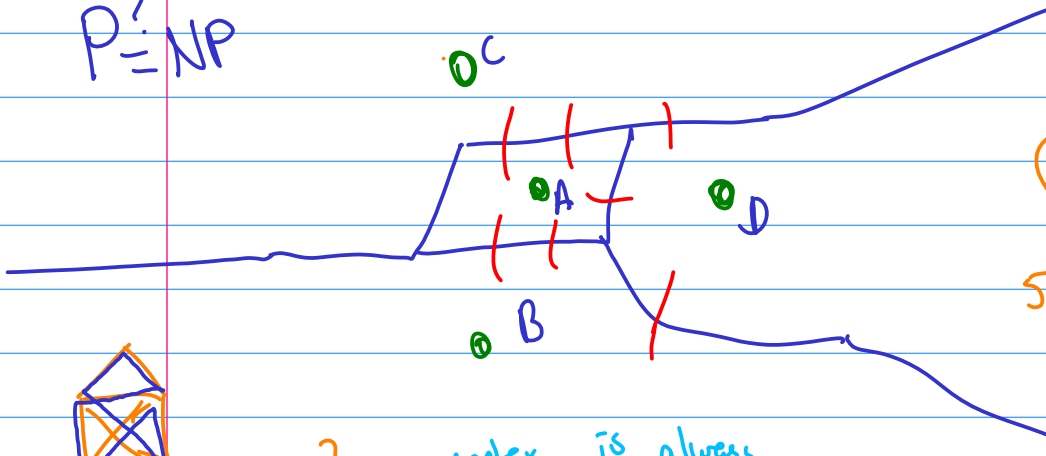


walk
trail
circuit
path
cycle

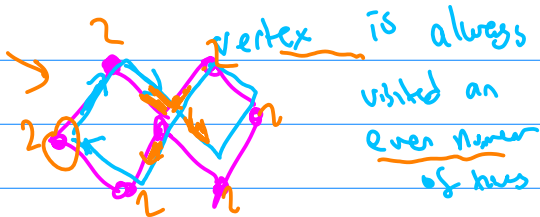
$P \stackrel{?}{=} NP$

How to visit every edge
once
Eulerian trail



$2n$ edges
Even degree

Degree: # of edges connected to v .



vertex is always visited an even number of times

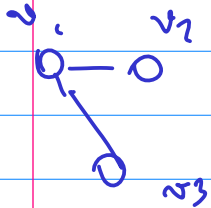
n vertices

$1B = 10^9$

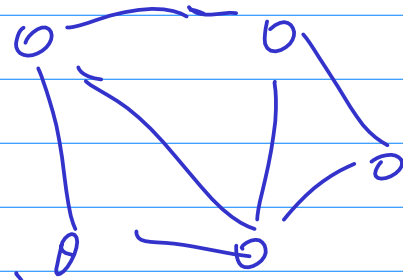
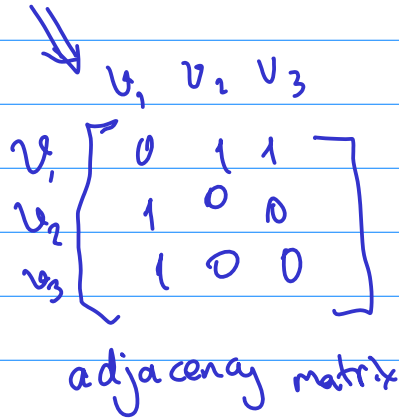
$$\binom{n}{2} = \frac{n(n-1)}{2} = O(n^2)$$

10^{18}

\Rightarrow Sparse graph - dense graph



\Rightarrow



\Rightarrow

$n(v_1) = \{v_2, v_3\}$

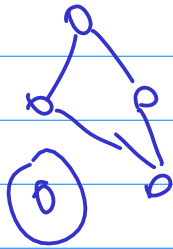
$n(v_3) = \{v_1\}$

$n(v_2) = \{v_1\}$

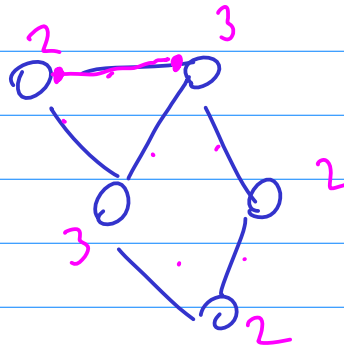
neighbor list

If we have an odd # of odd-degree vertices

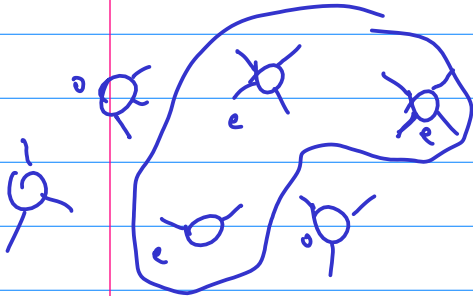
$\sum d = odd$

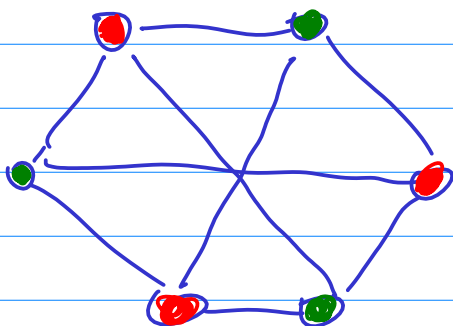
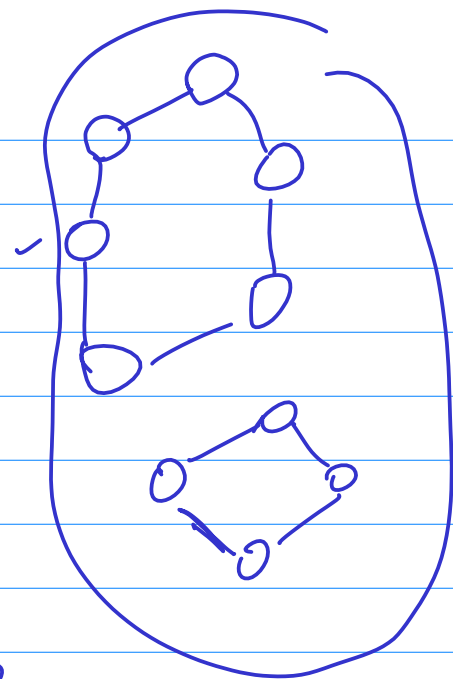
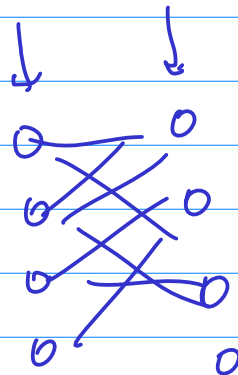
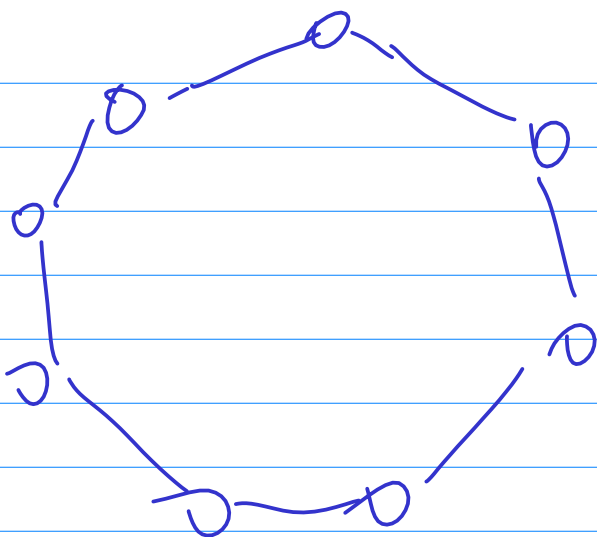


incident



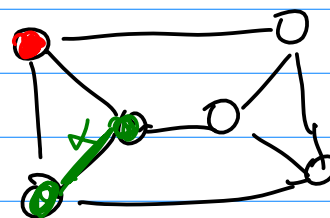
$12 = 2 \cdot 6$



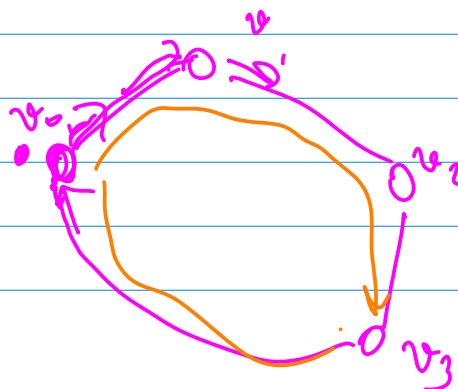
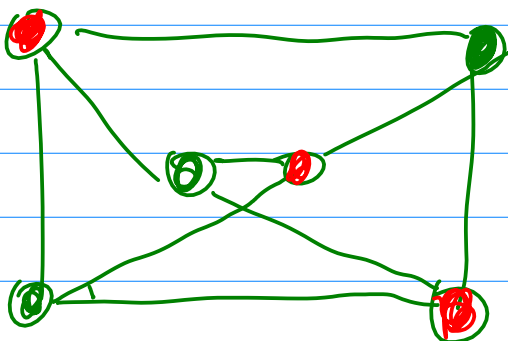


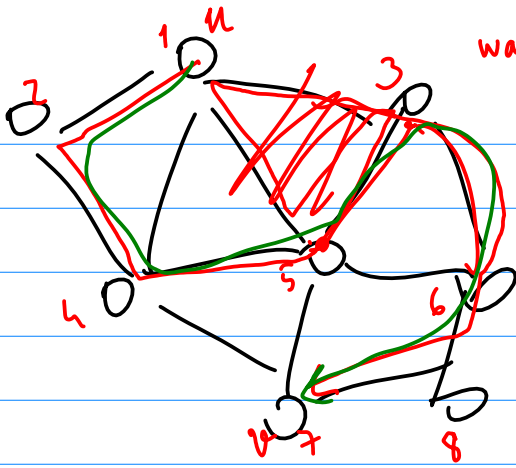
bipartite
✓

Thm. If there's a triangle in a graph
it cannot be bipartite.

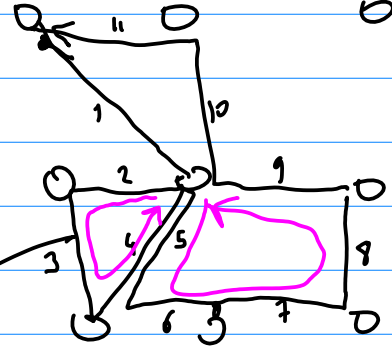


v_0, v_1, v_2, v_3, v_0





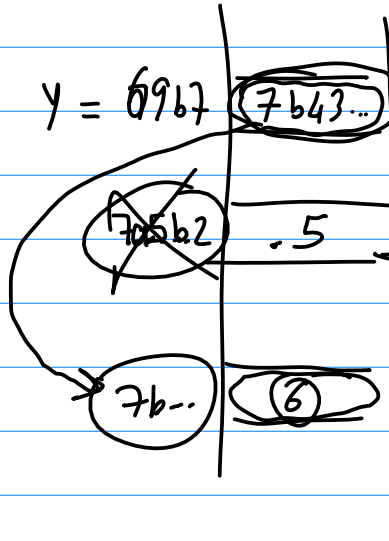
walk: 1 2 4 5 3 4 5 3 6 8 7



$$a + b + c + d = 11$$

int x = 5;

int* y = 6;



a = 5

f(5)

print(a)
6

5

f(int x) {

x++
return

}