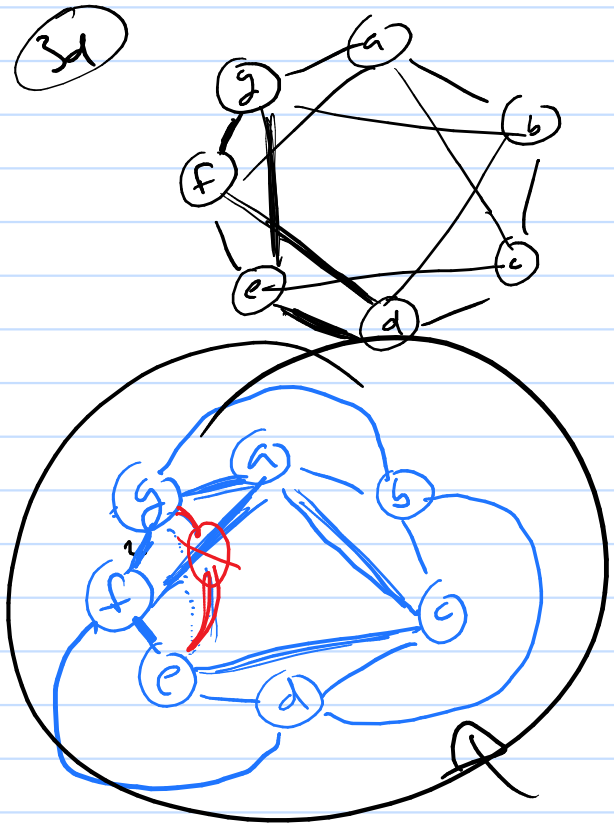
Math 530

1.4 (1, 3bdf, 7acd)

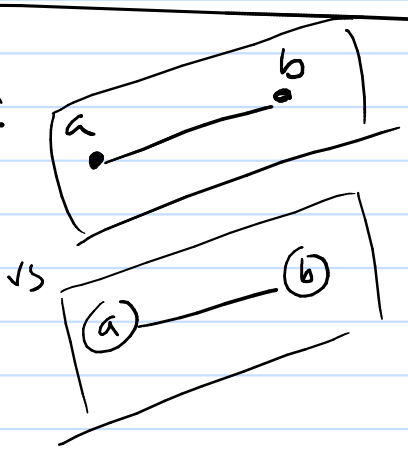
2.1 (1, 2, 3, a)

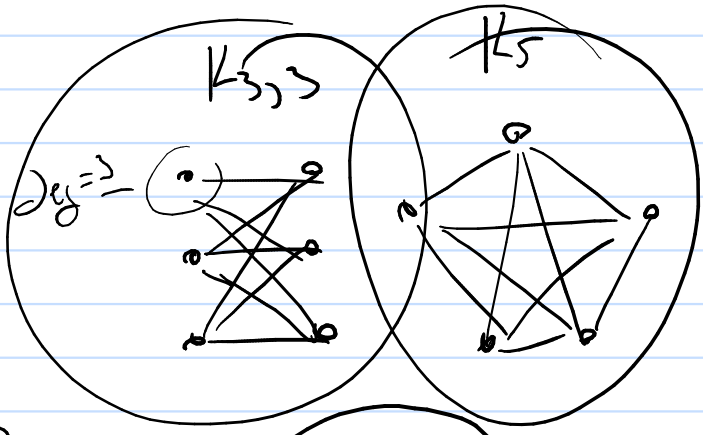
2.2 (1, 3, 5, 7a)

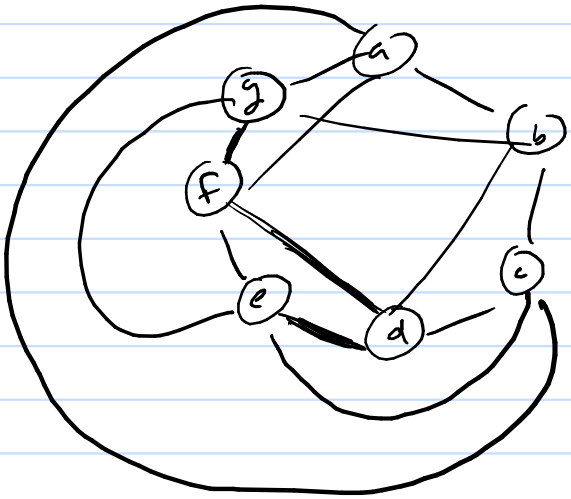
3d

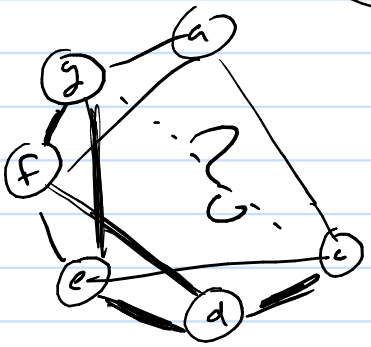


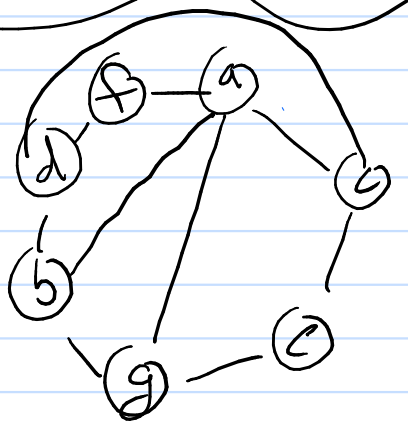
Graph

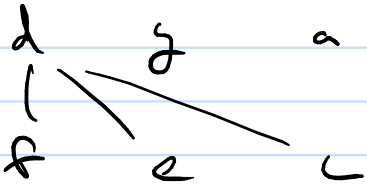






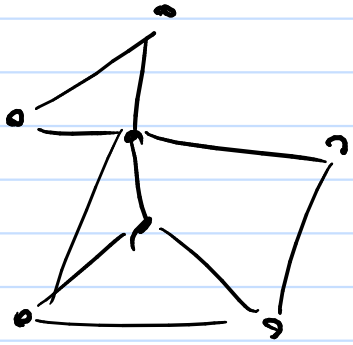






Euler and Hamilton Problems

$G = (V, E)$



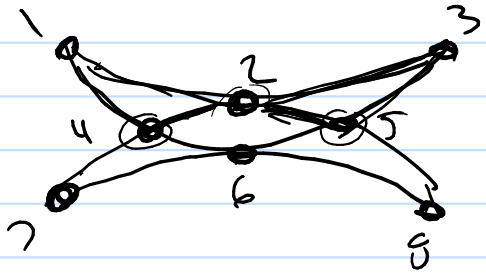
Simple circuit: begin/end at same vertex and use edges once

Simple path (not circuit): begin/end at different vertices and use edges only once.

Euler Question: use **all** edges
- in a simple circuit (Euler circuit)
- or simple path (Euler path)

Hamilton Question: use **all** vertices once in the
- simple circuit (Hamilton circuit)
- or simple path (Hamilton path)

Thm Euler circuit **iff** $\deg(x)$ = even for all $x \in V$

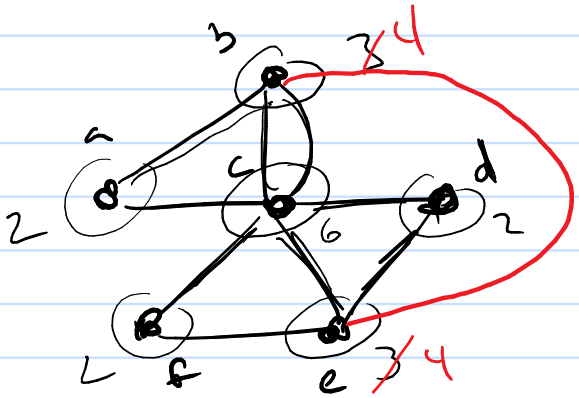


1, (2) 4, 1

1, (2, 3, 8, 7), (4) 1

1, 2, 3, (5, 6, 8, 5), 2, (4, 6, 7, 4), 1

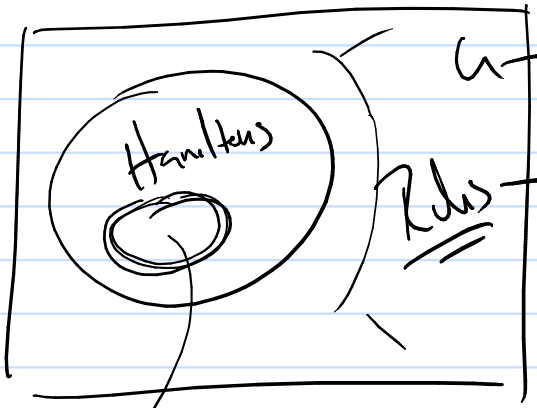
Thm Euler Path iff deg(v) = even for all but exactly 2 are odd

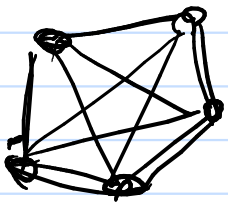


a, b, c, b, e, d, c, e, f, c, a

part c, d, c, e, f, c, a, b, c, b

Hamilton then are no nice thm for iff





Invariant Rules

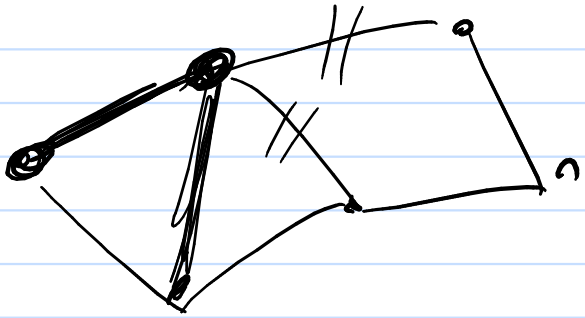
if you do have a Hamilton circuit

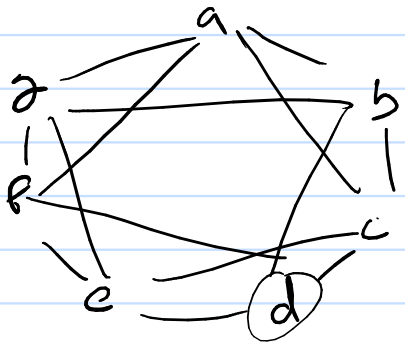
Rule 1 if deg(v) = 2? then both its edges must be in the circuit.

every vertex has one "go to" and one "leave" edge

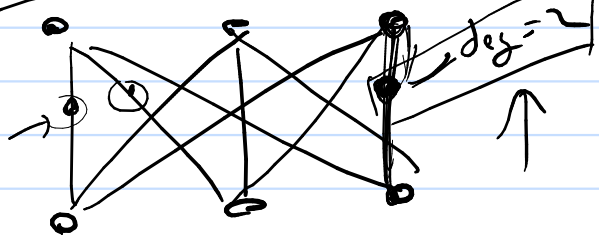
Rule 2 when building a Hamilton circuit no proper sub circuits exist.

Rule 3 go to a vertex of your Hamilton circuit, then all of its other edges must be removed.

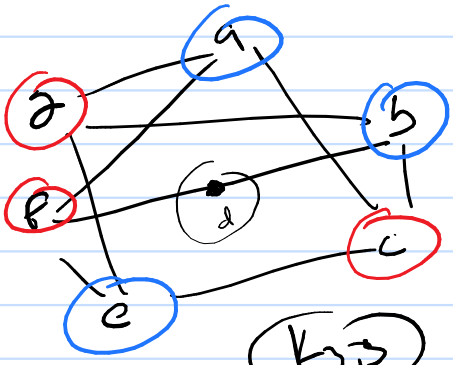




$K_{3,3}$



K_5



$K_{3,3}$

1.4 d

See 2nd video