Discrete Math : Scribed Notes(23/11/22)

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ISOMORPHISM

- A Bijective function to the vertex of one graph to the vertex set of other graph.
- An Isomorphism from G1=(V1,E1) to G2=(V2,E2) is a bijective function F:V1->V2 such that (x,y) is in E1 < -- > (f(x), f(y)) is in E2.
- Two graphs are isomorphic if they have at least one isomorphism between them.
- If we define relation on the set of all undirected simple graphs where two graphs are related if and only if they are isomorphic. Then this relation is equivalence relation.

  Reflexive:

  $$F : u \to v$$

  $$F(u) = V \ \forall \ u \in v$$

  $$(x, y) \in E \Leftrightarrow (f (x), f (y)) \in E$$

  Symmetric:

  $$(x, y) \in E1 \Leftrightarrow (f (x), f (y)) \in E2$$

  $$g(F(x), F(y)) = (x, y) = (x, y)$$

  $$F : V1 \to V2 \ (x, y) \in E$$

  $$G : V2 \to V3 \ (F(x), F(y)) \in E2$$

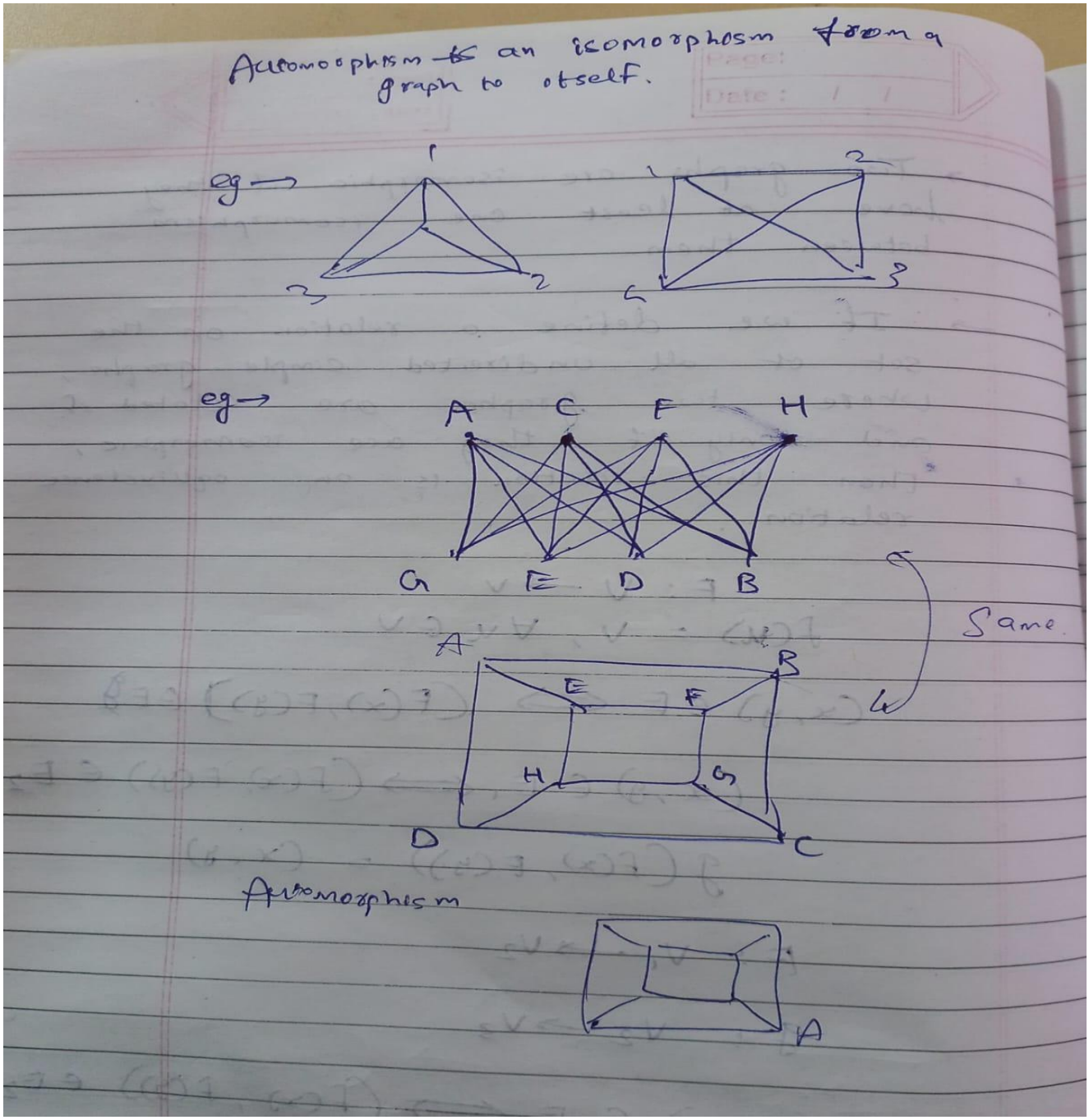
Transitive:

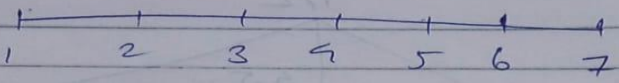
F : G1 -> G2

g : G2 -> G3

(x, y) ∈ E1 ⇔ (f (x), f (y)) ∈ E2

(a, b) ∈ E2 ⇔ (g (a), g (b)) ∈ E3





$F(1) = 6$

$F(2) = \{5, 7\}$

∴ $F(2)$ is either 5 or 7

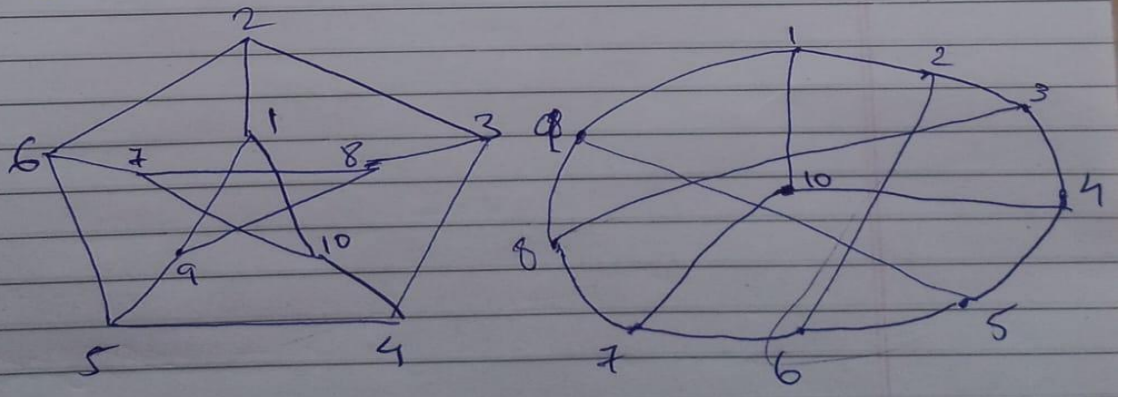
$F(1)$ is mapped to 7.

$F(3)$ has to be neighbour of 7 ie. 6.

but now $F(1) = F(3) = 6$ so not bijection

∴ Not an automorphism

Peterson Graph



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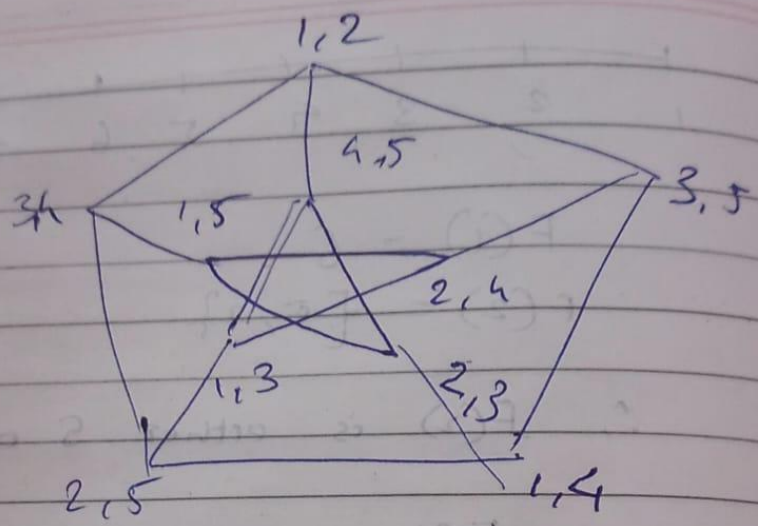

Algebraic defn of peterson graph.

Isomorphic

eg → $G \cong H \iff \bar{G} \cong \bar{H}$