Homework Part-III
Discrete Mathematics
CS201@IITG Fall '25 R. Inkulu

1. [16th Oct]
   (i)
2. [15th Oct]
   (i)
3. [14th Oct]
   (i) Identify a dimetral pair, a central node, a maximum path, and a maximal path in the figure given for Exer 39 (b) of [R] pg 727.
   (ii) Draw a non-trivial connected simple graph that has more than one central node.
   (iii) Find the eccentricity of each node of the Petersen graph. In addition, find its diameter and radius.
4. [9th Oct]
   (i) Prove the degree of dual vertex corresponding to outer face in the proof of Sperner's lemma is odd.
   (ii) Replace p with 3 in Turan's theorem and check whether it yields a proof for Mantel's theorem.
   (iii) Check whether the degree-sum formula is applicable to multigraphs and pseudographs. What about the handshaking lemma?
5. [8th Oct]
   (i) Precisely define all the terms that were introduced in today's class under graph theory, and give an example for each of them.
   (ii) Exer 29, 32 from [R] pg 427.
6. [7th Oct]
   (i) Exer 13, 34, 45 from [R] pg 426-428.
7. [22nd Oct]
   (i) Provide proofs for the (in)equalities listed for Fibonacci numbers on the lecture note.
8. [21st Oct]
   (i) Exer 38, 39, 45 from [R] pg 577.
9. [3rd Oct]
   (i) Exer 26, 34 from [R] pg 552
   (ii) Prove Theorem 2 from [R] pg 544.
   (iii) Exer 60 from [R] pg 457.

10. [24th Sep]

    (i) Exer 4, 6, 7 from [R] pg 591.

    (ii) Exer 16, 18 from [R] pg 455.

11. [23rd Sep]

    (i) Exer 74 from [R] pg 419.

    (ii) Give informal but convincing arguments to argue the propositions under parenthesis for Example 6 on pg 449 of [R] are correct.