Indian Statistical Institute, Bangalore Centre.
End-Semester Exam : Discrete Mathematics I - B2

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Date : Sep 23, 2023.

Max. points : 10. **Time Limit : 1.5 hours.**

Give complete proofs. Please cite/quote appropriate results from class. You are also allowed to use results from other problems in the question paper.All questions carry equal points.

Attempt any two questions only. If more than two questions are attempted, only the first two will be corrected.

1. Let G be an n-vertex graph. If every vertex has degree at least $(n-1)/2$ then G is connected.
2. Let $0 < a_1 < \ldots < a_{sr+1}$ be $sr+1$ integers. Prove that we can select either $s+1$ of them, no one of which divides any other, or $r+1$ of them with each dividing the following one.
3. Let G be a bi-partite graph with partition $V = A \sqcup B$. Let $\max_{v \in B} d_v \leq \min_{u \in A} d_u$ i.e., the minimum degree of vertices in A is at least that of the maximum degree of vertices in B. Show that there exists a complete matching on A.