The Mathematics of the Discrete

Practice problems

1. Determine if the following scenario is a problem of continuous or discrete mathematics: Calculating the number of different ways to choose a committee of 3 people from a group of 10.
2. A city has 4 districts connected by 5 bridges. If we want to find the shortest path between two districts, which area of discrete mathematics should we use?
3. Is the set of all real numbers between 0 and 1 a discrete or continuous set?

Solutions

1. Determine if the following scenario is a problem of continuous or discrete mathematics: Calculating the number of different ways to choose a committee of 3 people from a group of 10.

   - The objects being counted are people, which are distinct and separate entities.
   - The number of people must be an integer; you cannot have 2.5 people on a committee.
   - This is a counting problem involving combinations.

   Answer: Discrete

2. A city has 4 districts connected by 5 bridges. If we want to find the shortest path between two districts, which area of discrete mathematics should we use?

   - The districts can be represented as vertices in a graph.
   - The bridges can be represented as edges connecting those vertices.
   - Finding the shortest path in a network of vertices and edges is a core problem of graph theory.

   Answer: Graph Theory

3. Is the set of all real numbers between 0 and 1 a discrete or continuous set?

   - Between any two real numbers, there is always another real number.
   - There are no 'gaps' or 'steps' in the set of real numbers.
   - This property defines a continuous interval.

   Answer: Continuous
