

Section 3.4 - Equivalence Relations

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1 Definition

Definition: An equivalence relation $\sim$ on a set S is a relation on S that is reflexive, symmetric, and transitive.

1.1 Examples

1. Define $\sim$ on a set V of vertices from a graph $G = (V, E, \gamma)$. For $u, v \in V$, Let $u \sim v$ mean that $u = v$ or there is a path in G from u to v .
2. Define C on a set of marbles, M . Let $u C v$ mean that u and v have the same color.

2 Equivalence classes

Definition: Let R be an equivalence relation on a set S , and let $s \in S$. Then, the equivalence class of s , denoted $[s]$ is the set of all elements related to s under R . I.e. $[s] = \{t \in S : s R t\}$.

Note: The equivalence classes of a relation R are disjoint.

2.1 Examples

What do the equivalence classes look like for C and $\sim$ above?