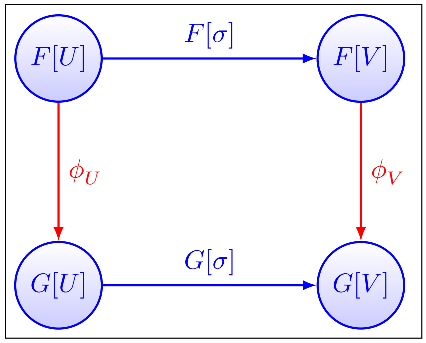
Isomorphism of Species

Definition

Let, F, G be two Combinatorial Species,

We say that,

$F \cong G \iff \forall U \in \Omega \exists \phi_U : F[U] \longrightarrow G[U] \ni \phi_U$ is a bijection which respects transport of structure.

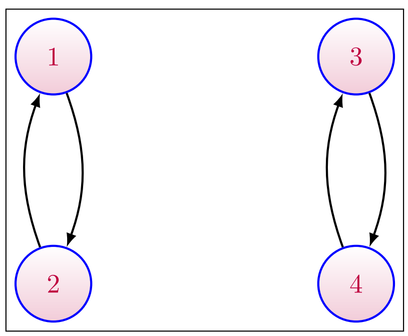


Transfer of structure by ϕ_U

More formally speaking, $\forall F, G :$ Combinatorial Species, $F \cong G \iff \forall \sigma : U \longrightarrow V \in \Gamma, \phi_V \circ F[\sigma] = G[\sigma] \circ \phi_U$

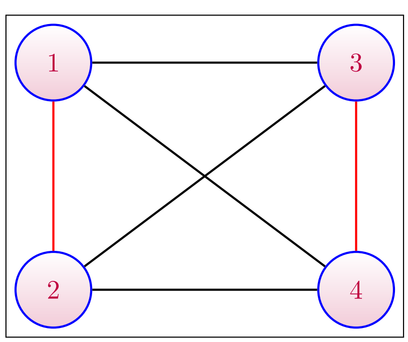
Example

$$\mathcal{I}nv_0[U] := \left\{\sigma \in \mathcal{S}(U) \,\middle|\, \forall u \in U, \sigma^2(u) = u, \sigma(u) \neq u\right\}$$



Fixed point free involution of 4 nodes

$$M_2[U] := \text{Perfect matchings on the complete graph of U}$$



Define:

$$\forall s \in \mathcal{I}nv_0[U], \phi_U(s) = (u, s(u))$$