



The negative relation

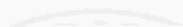


The Yang-Baxter equation

If X is a non-empty set, a **set-theoretical solution** of the Yang-Baxter equation $r : X \times X \rightarrow X \times X$ is a map such that the following **identity**

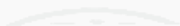
$$(r_1 r_2 r_1) = (r_2 r_1 r_2) \text{ id}_R$$

is satisfied, where $r_1 = r \times \text{id}_R$



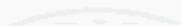
Solutions of the assignment questions

In particular, if X is a set, $r : X \rightarrow X \times X$ is a solution and $a, b \in X$,

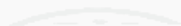


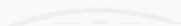
Why the state-of-the-art?

In 1950s – Hotelling, Samuelson and Solow, Galbraith and Van den Boven



chiefly the state of the world









Definition: the Yang-Maxwell system

Let $(S; r_S)$ and $(T; r_T)$ be solutions and $\gamma : T \rightarrow \text{Sym}(S)$





Theorem: the existence of solutions

Let $(S; r_S; T; r_T; \dots)$ be a matched product system. Let





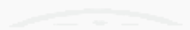




the case

The matched product of left non-degenerate involutive solution (III)

Let $(S;r_S), (T;r_T)$ be left non-degenerate involutive solution and







An example

Let $r: S \times S \rightarrow S \times S$ be an involutive left non-degenerate solution. If $\sigma: S \rightarrow \text{Sym}(S)$ is defined by $\sigma(u) := \sigma_u$ and $\sigma_a := \sigma_a$, for all $a, u \in S$, then $(S; r; S; r; \sigma)$ is a matched product system.



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