Introducing Equality to the Gadget Game

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Overview

Rewinding the Clock

Motivation for Equality Gadgets

Implementation of Equality Gadgets

Mathematical Implementation Details

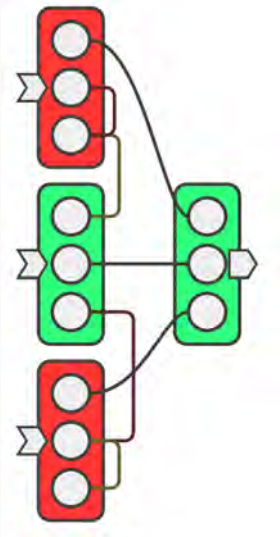
Problems

Other Work

Rewinding the Clock

Study Platform For Maths

- Underlying maths is concealed



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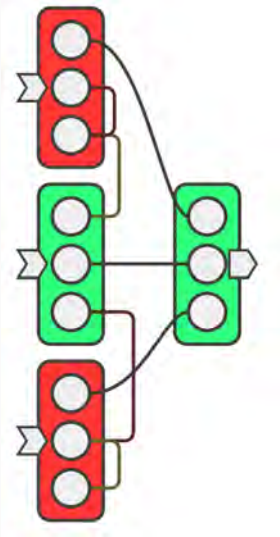
  - $\text{Green}(A, B, C) \implies A = BC.$
    $\text{Red}(A, B, C) \implies A = B + C.$



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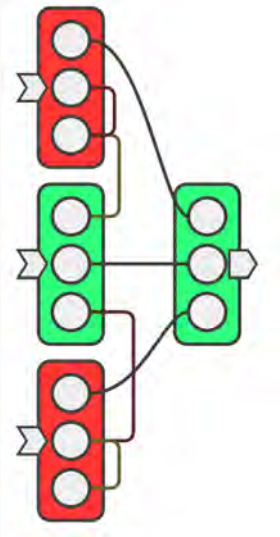
- Underlying maths is concealed
  - $\text{Green}(A, B, C) \implies A = BC.$
    $\text{Red}(A, B, C) \implies A = B + C.$
  - $A = 2B$, $B = CD$, $E = 2D$.
    So $A = 2CD = CE$.



Rewinding the Clock

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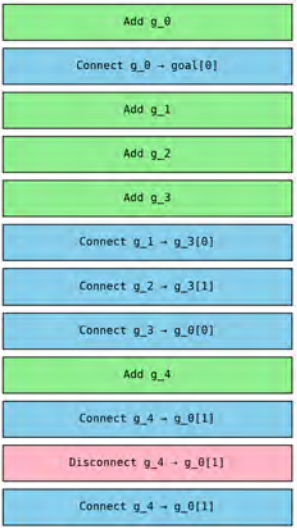

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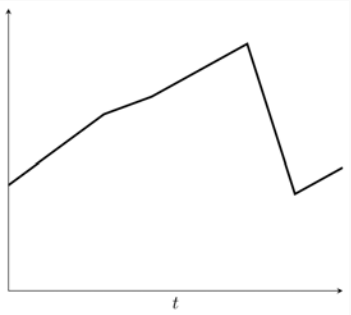
- Event collection
- Analysis of events and strategies



Study Platform For Maths

- Underlying maths is concealed
- Event collection
- Analysis of events and strategies
- Gamification and enjoyability

Gameplay & Strategies

What is $33653138 \times 241238086$?

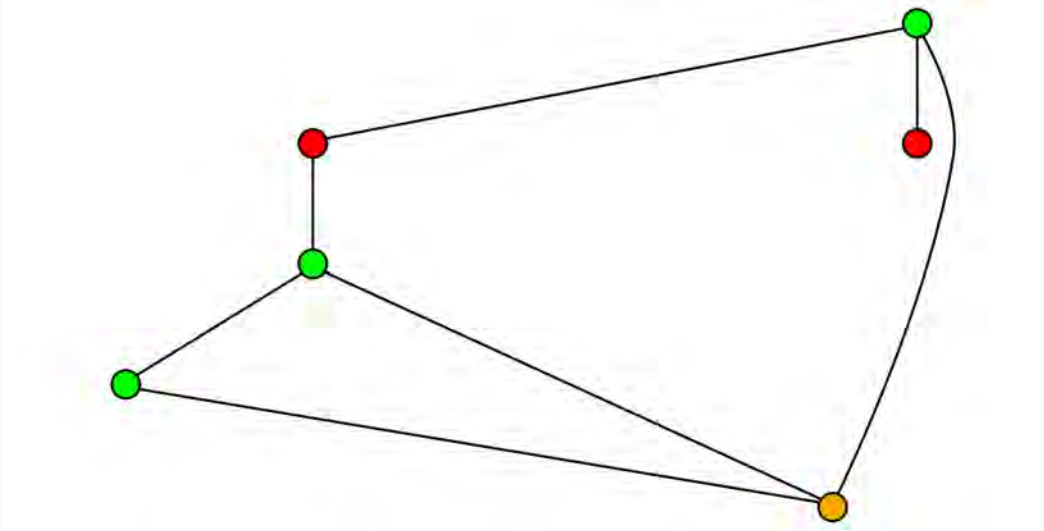
a. 5

b. -3

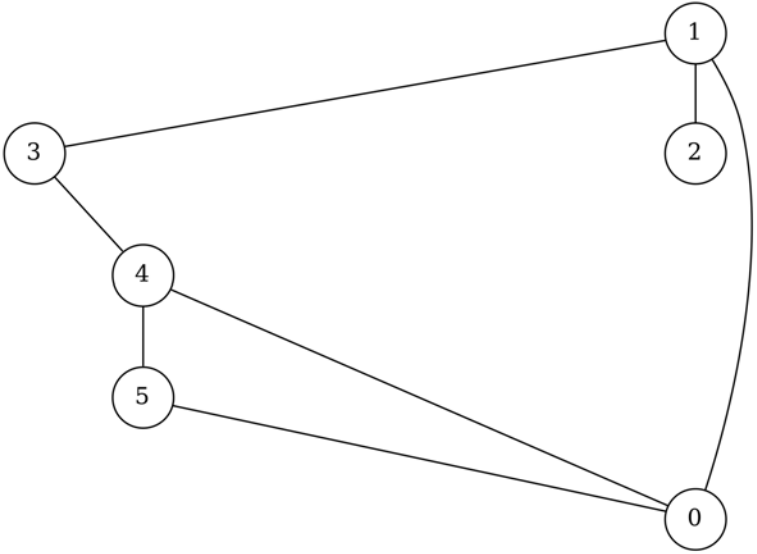
c. 10^{1000}

d. 8118418599013868

Gameplay & Strategies



Gameplay & Strategies



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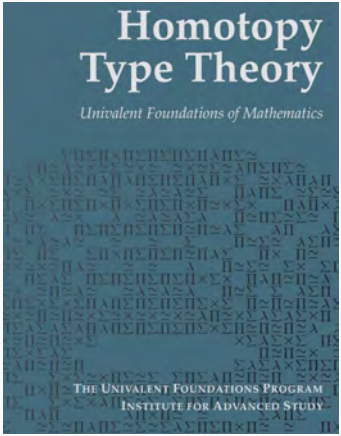

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  - Novel mediums have novel problems
  - De-obfuscation
- Topic of thought in type theory
- Regular handling is still difficult
- Fits into the game and opens new modes of computation

```
0 := λf.λx.x
1 := λf.λx.f x
2 := λf.λx.f (f x)
```

Implementation of Equality Gadgets

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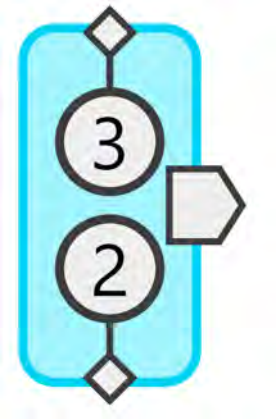
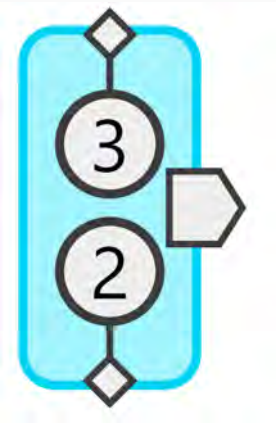
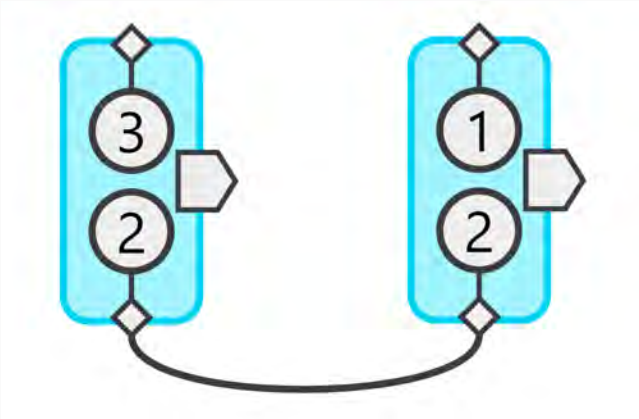




Naturally get symmetry



And transitivity

Implementation of Equality Gadgets

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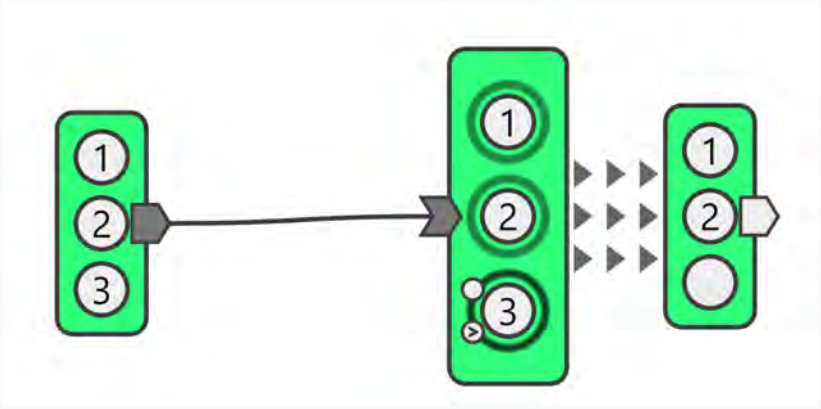

$$\forall x \forall y [x = y \implies \forall F (F\,x \iff F\,y)]$$

Mathematical Implementation Details

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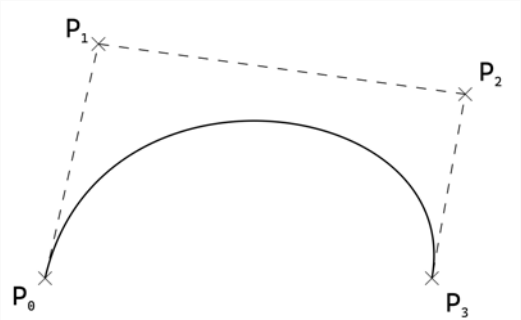
$$o = \min\left(80, 20 + y_d \cdot \frac{5}{6}\right)$$



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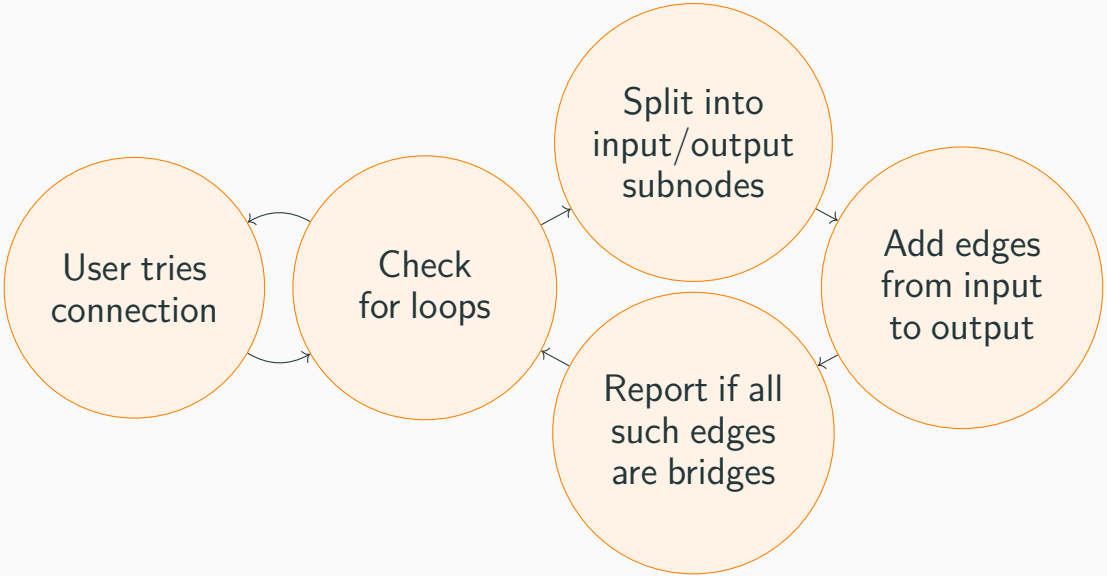

Mathematical Implementation Details

$$\texttt{low}[v] = \begin{cases} \texttt{tin}[v] & \\ \texttt{tin}[p] & \text{(v, p) is a back edge} \\ \texttt{low}[t] & \text{(v, t) is a tree edge} \end{cases}$$

from: "Algorithms for Competitive Programming".

Problems

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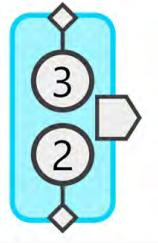

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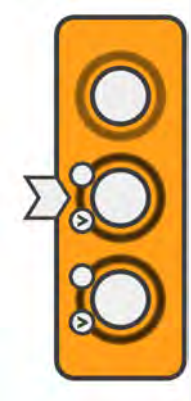

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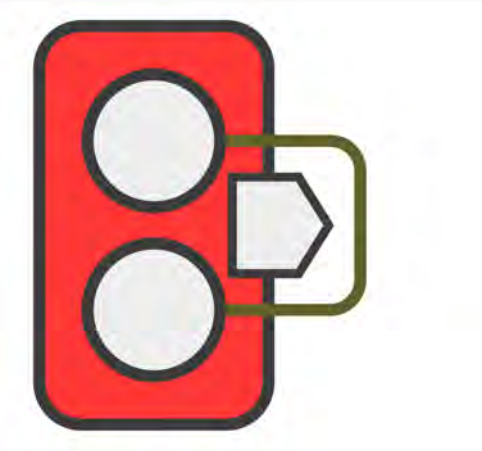

Other Work

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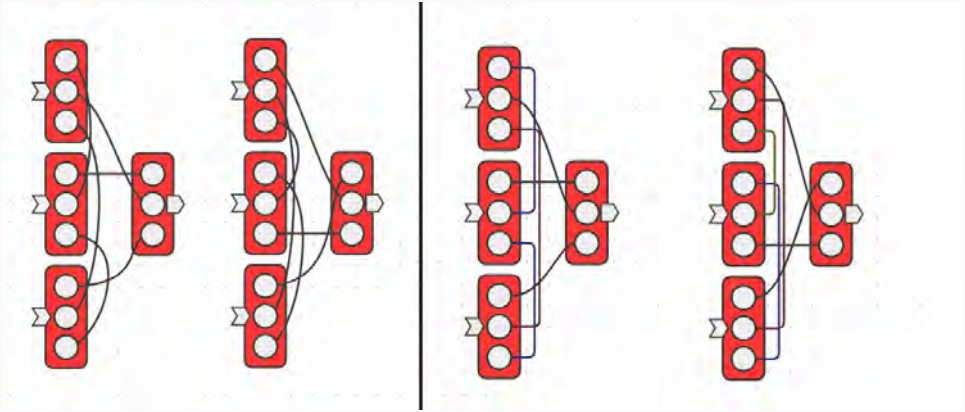
```
CREATE TABLE study_data (
    player_id VARCHAR(255) NOT NULL,
    problem_id VARCHAR(255) NOT NULL,
    config VARCHAR(255) NOT NULL,
    completed BOOLEAN NOT NULL,
    start TIMESTAMP NOT NULL,
    latest TIMESTAMP NOT NULL,
    history JSONB NOT NULL,
    CONSTRAINT study_data_player_id_problem_id_start_key UNIQUE (player_id,
    ↪  problem_id, start)
);
```

Other Work



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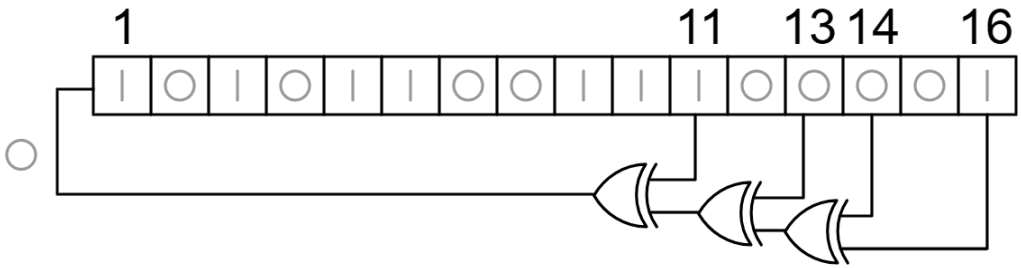

Other Work

Hope you enjoyed!

vercel-testing-rho-amber.vercel.app/internal/game/eq4