classmate
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RECURSION

ITERATIVE SYSTEMS

ARS = $(A, \rightarrow) \rightarrow \subseteq A \times A$

$\langle \mathbb{N}, inc: \mathbb{N} \rightarrow \mathbb{N} \rangle$

$inc(n) = n + 1$

$trace(x_0) = (x_0, F(x_0), F^2(x_0), \ldots)$

$trace(0) = (0, 1, 2, \ldots)$.

factorial

$X = \mathbb{N}^2$

$\underbrace{F(i, a)}_{x} = (i-1, a * i) \quad i > 0$

$x_0 = (n, 1) \quad (i, a) \quad i = 0$

$(3, 1) \rightarrow (2, 3) \rightarrow (1, 6) \rightarrow (0, 6)$

$x_0 \quad F(x_0) \quad F^2(x_0) \quad F^3(x_0) \quad F(F^3(x_0)) = F^3(x_0)$

```
fac (n) {
  int i, a;
  (i, a) = (n, 1)
  while ((i, a) != F(i, a)) { }
    (i, a) = F(i, a)
  }
  return a
```

```
F (i, a) {
  cf i == 0 -> (i, a)
  else      -> (i-1, a*i)
```

$x : \mathbb{R} \to A$ $(\mathbb{R})$ x is a signal (of time)

$\dot{x} = F(x)$

$\dot{x}(t) = F(x)$

$X : \mathbb{N} \to A$

$F : A \to A$

$x' : F(x)$

tail recursive version : loop.

register.

;;; v4 reg

;;; v5 goto

Define !/goto

exp. value = number? | bool? | proc.

denotable value =

env = id → denotable val.

store = loc → exp. val

value = ... → exp. val.

denotable val. = loc (storableval)

Store : Loc → Storableval.

exp. v. = num? | bool? | proc?

deno. v. = Loc.

env : id → denot. val.

store = loc → store v.

storev. = exp. v.