# GRAM SYNTHESIS IVE BIDIRECTIONAL EVALUATION

<u>Justin Lubin</u><sup>1</sup> Nick Collins<sup>1</sup> Cyrus Omar<sup>2</sup> Ravi Chugh<sup>1</sup>

<sup>1</sup>University of Chicago <sup>2</sup> University of Michigan

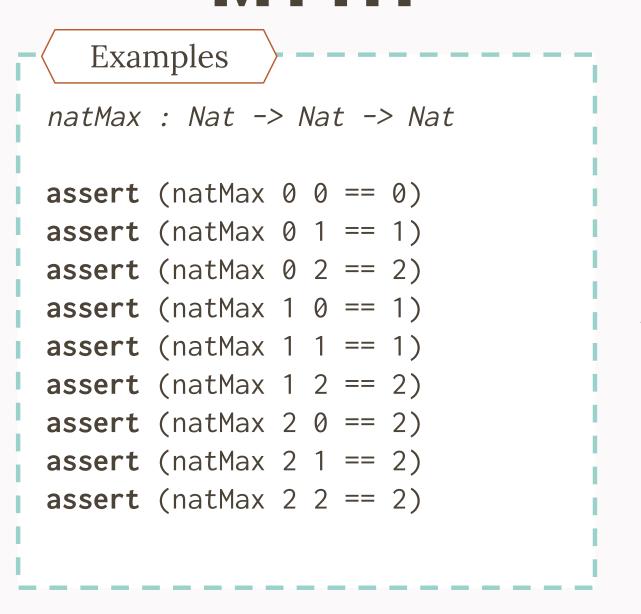
### **PROGRAM SYNTHESIS**

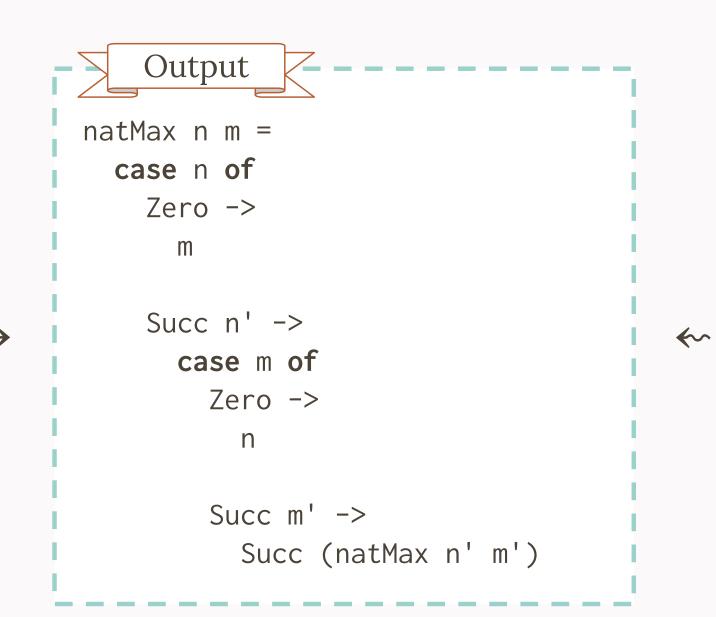
Computer generation of programs satisfying a specification

### PROGRAMMING BY EXAMPLE

Specification assert (sort [] == []) assert (sort [3, 1, 2] == [1, 2, 3]) **Satisfaction** Dynamic verification

Test each input-output pair: evaluate and check

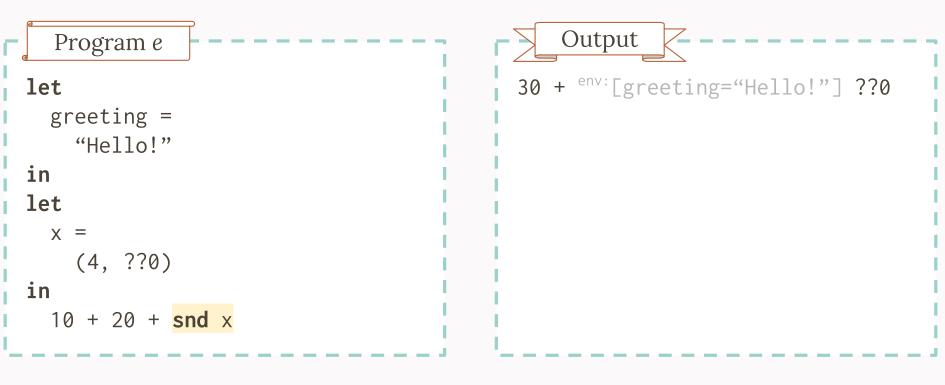






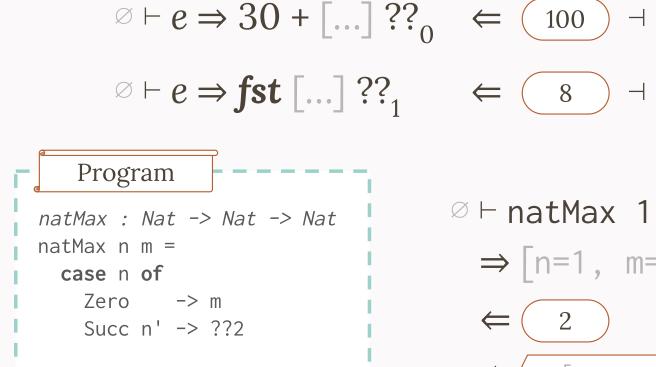
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Examples
assert (natMax 1 0 == 1)
assert (natMax 1 1 == 1)
assert (natMax 1 2 == 2)
    Sketch
natMax : Nat -> Nat -> Nat
natMax n m =
 case n of
   Zero ->
   Succ n' ->
```

## LIVE EVALUATION



 $\varnothing \vdash e \Rightarrow 30 + \text{env:}[\text{greeting="Hello!"}]??_0$ 

## LIVE UNEVALUATION

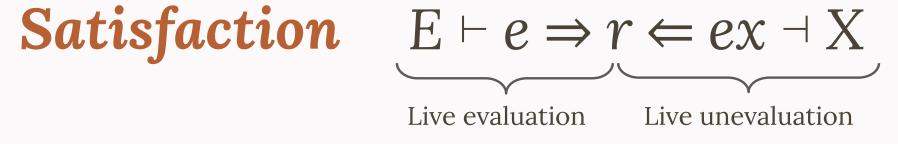


∅ ⊢ natMax 1 2  $\Rightarrow$  [n=1, m=2, n'=0]?? [n=1, m=2, n'=0] ??<sub>2</sub> = 2

 $[\ldots] ??_1 \vDash (8, \top)$ 

# LIVE BIDIRECTIONAL EVALUAT





assert (natMax 1 2 == 2)

