double notation

- LIKE PEANO NUMBERS IN THAT ITS A LIST REPRESENTATION OF NUMBERS
- LIMITED TO THREE SYMBOLS
  - zero
    - THE NUMBER zero (∅)
    - THE "STARTING POINT"
  - D
    - "DOUBLE"
    - DOUBLES WHATS IN PARENTHESES
    - SAME AS 2(x)
  - DP1
    - "DOUBLE PLUS 1"
    - DOUBLES WHATS IN PARENTHESES THEN ADDS ONE
    - SAME AS 2(x)+1

NUM	DOUBLE NOTATION	MATHEMATICAL PROOF
∅	zero	∅
1	(zero) DP1	2(∅)+1
2	((zero) DP1) D	2(2(∅)+1)
3	((zero) DP1) DP1	2(2(∅)+1)+1
4	(((zero) DP1) D) D	2(2(2(∅)+1))
5	(((zero) DP1) D) DP1	2(2(2(∅)+1))+1
6	(((zero) DP1) DP1) D	2(2(2(∅)+1)+1)
7	(((zero) DP1) DP1) DP1	2(2(2(∅)+1)+1)+1

- LOOKS A LOT LIKE BINARY
  - D = 0 ; DP1 = 1
  - 6 → (((zero) DP1) DP1) D → 0110

ADDITION

(D(DP1(zero)) + (DP1(DP1(DP1(zero))))

- LETS BREAK THIS DOWN
- FOCUS ON THE OUTER MOST TERMS FIRST
- THREE COMBINATIONS OF OUTER TERMS
  - D + D
  - D + DP1
  - DP1 + DP1

D + D

- DOUBLE MEANS 2 × SOMETHING

D(SOMETHING) + D(SOMETHING)

↓

2(x) + 2(x)

4(x)

2(2(x))

↓

D(D(SOMETHING))

- BASIC PROCESS IS AS FOLLOWS
  - TRANSLATE DOUBLE NOTATION INTO ITS MATHEMATIC COUNTERPART
  - USE BASIC MATH TO TURN TWO TERMS INTO ONE WE CAN USE
  - TRANSLATE BACK INTO DOUBLE NOTATION

D + DP1

D(SOMETHING) + DP1(SOMETHING)

↓

$2(x) + 2(x)+1$

$4(x)+1$

$2(2x)+1$

↓

D(DP1(SOMETHING))

DP1 + DP1

DP1(SOMETHING) + DP1(SOMETHING)

↓

$2(x)+1 + 2(x)+1$

$4(x)+2$

$2(2(x)+1)$

↓

D(DP1(SOMETHING))

FULL ADDITION

- WORK LEFT TO RIGHT DOING THE SMALLER ADDITIONS AND CARRYING
- WHEN ADDING TO zero, USE THE IDENTITY PROPERTY
  - D + zero = D
  - DP1 + zero = DP1

		D	DP1	DP1 - carry
6	D	DP 1	DP1	Z
+ 2	+ D	DP1	Z	
8	D	D	D	DP1 Z