

# FIBONACCI SEQUENCE

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

Notation:  $F_0 = 0, F_1 = 1, F_2 = 1, \dots$

$$F_n = F_{n-1} + F_{n-2} \quad \text{for } n \geq 2$$

Recursive Definition

$$F_{30} = F_{29} + F_{28}$$

$$= (F_{28} + F_{27}) + (F_{27} + F_{26})$$

$$= ((F_{27} + F_{26}) + (F_{26} + F_{25})) + ((F_{26} + F_{25}) + (F_{25} + F_{24}))$$

not efficient!

$$= F_1 + F_0 + F_1 + \dots + F_0$$

Iterative Approach: use a loop with two accumulators to store the two most recent Fibonacci numbers

Variables	step 1	step 2	step 3	step 4
a	0	1	1	2
b	1	1	2	3
next	$\frac{1}{1}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{5}$

