$1 ≠ $1

today > future

one year : $FV = PV(1+r)$

1,000 ⟶ 1,050 ⟶ $1{,}000 + 2.50 = 1{,}100.00$ (simple)

$1{,}000(1+.05)$

1,050 ⟶ $1{,}000(1+0.05)\cdot(1+0.05)$ (compound)

$= 1{,}000\cdot(1+0.05)^2$

$= 1{,}102.50$

$FV = PV(1+r)$ one-year loan one period

$PV \xrightarrow{1\ year} PV + interest_1 \longrightarrow PV + 2 \cdot interest_1$

$FV_1 \qquad\qquad FV_2$

compound interest

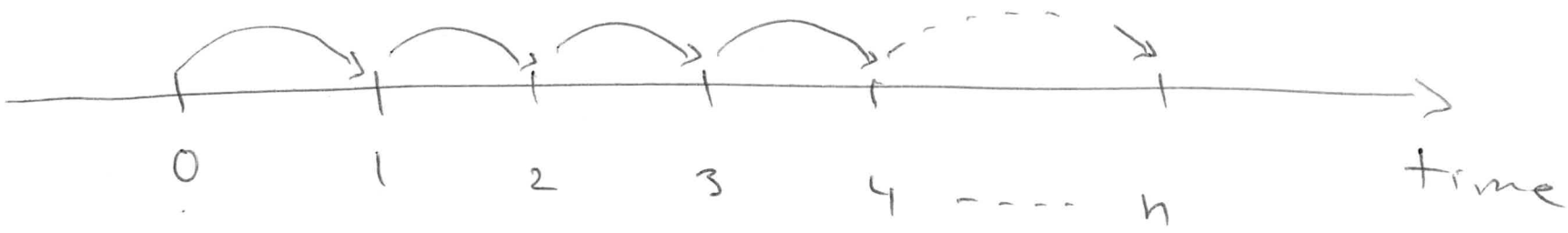
$PV \longrightarrow \underbrace{PV(1+r)}_{PV'} \longrightarrow PV'(1+r)$

$= PV(1+r)(1+r)$

$= PV(1+r)^2$

n years, int. rate = r, principal = PV

$$FV = PV(1+r)^n$$ "n = t"

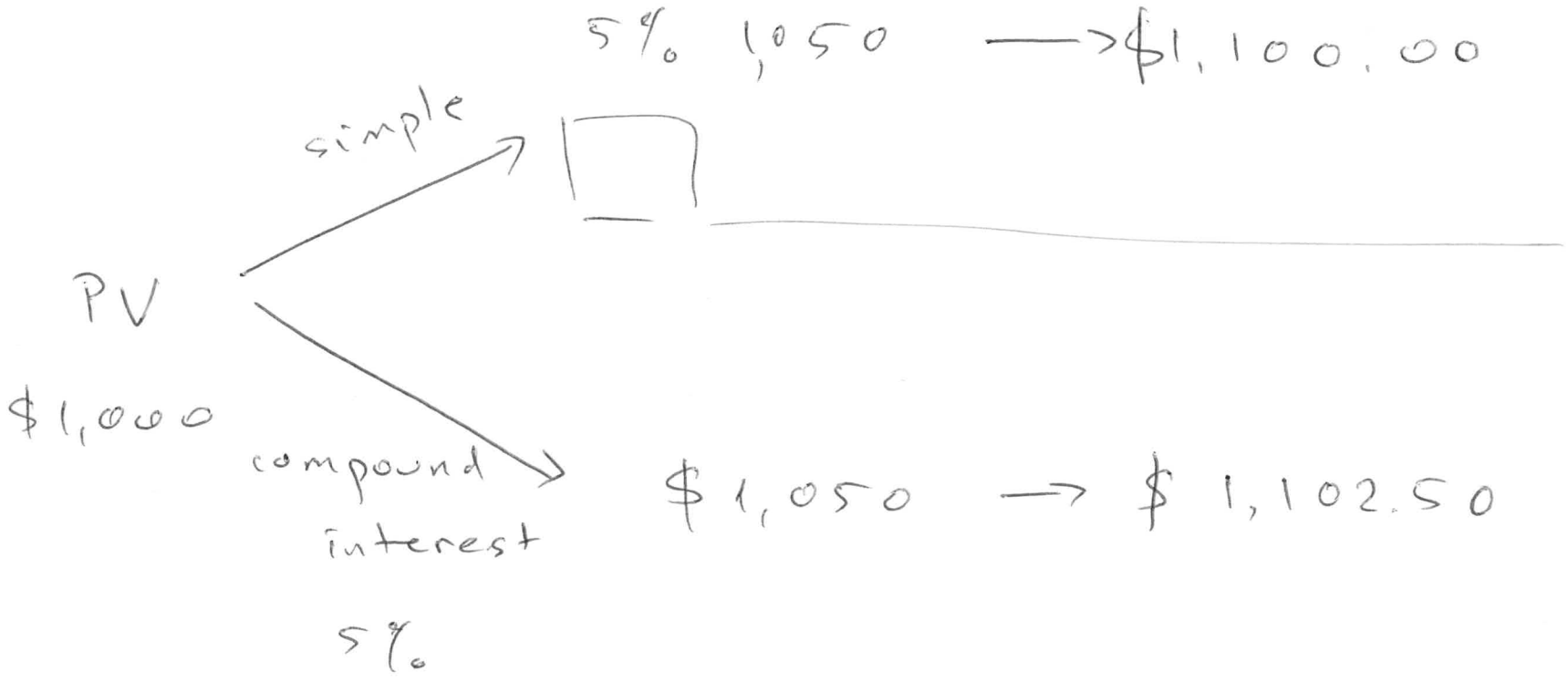


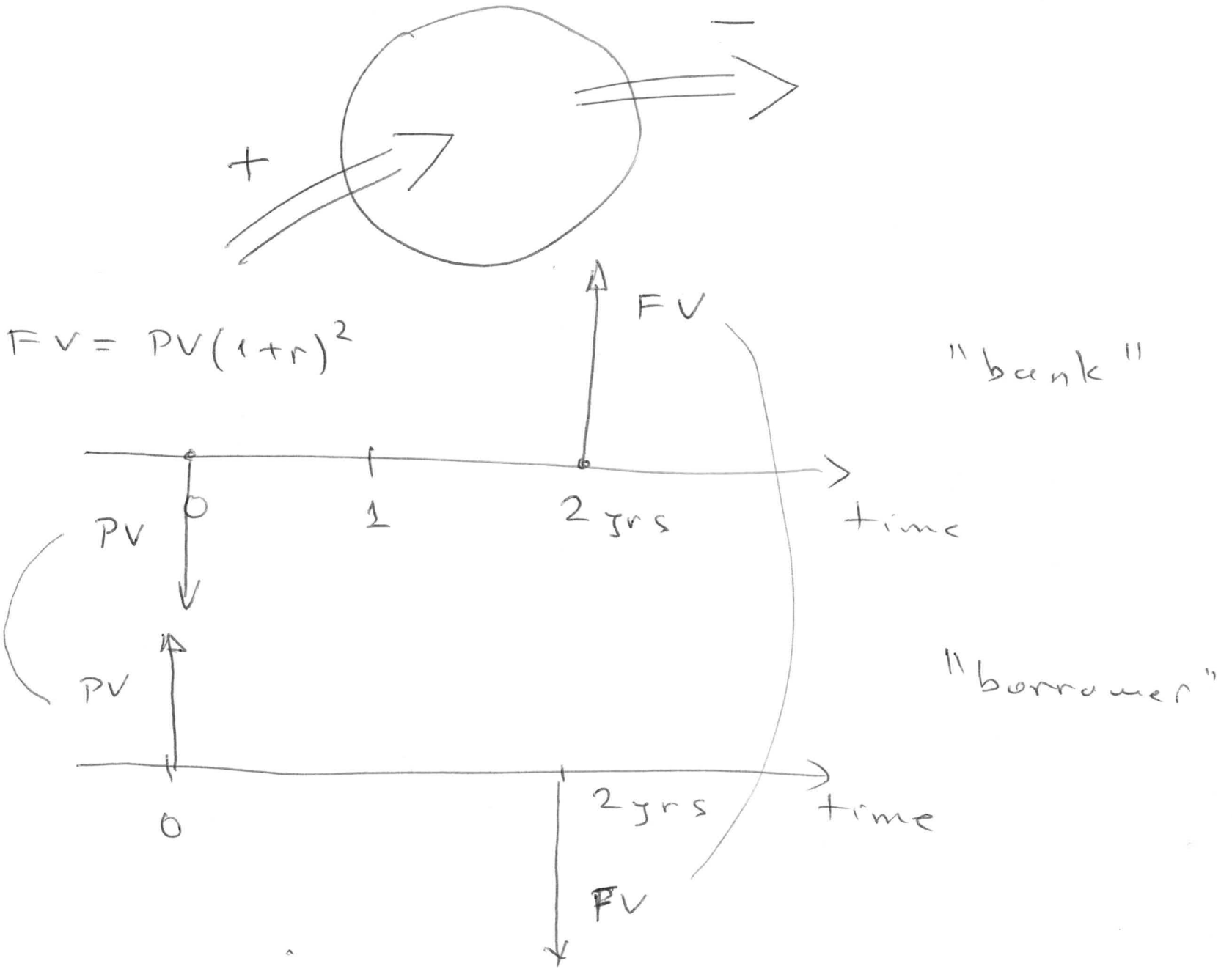
interest earned = $FV - PV$

$= PV(1+r)^n - PV$

$= PV[(1+r)^n - 1]$

$$FV = PV(1+r)^n$$

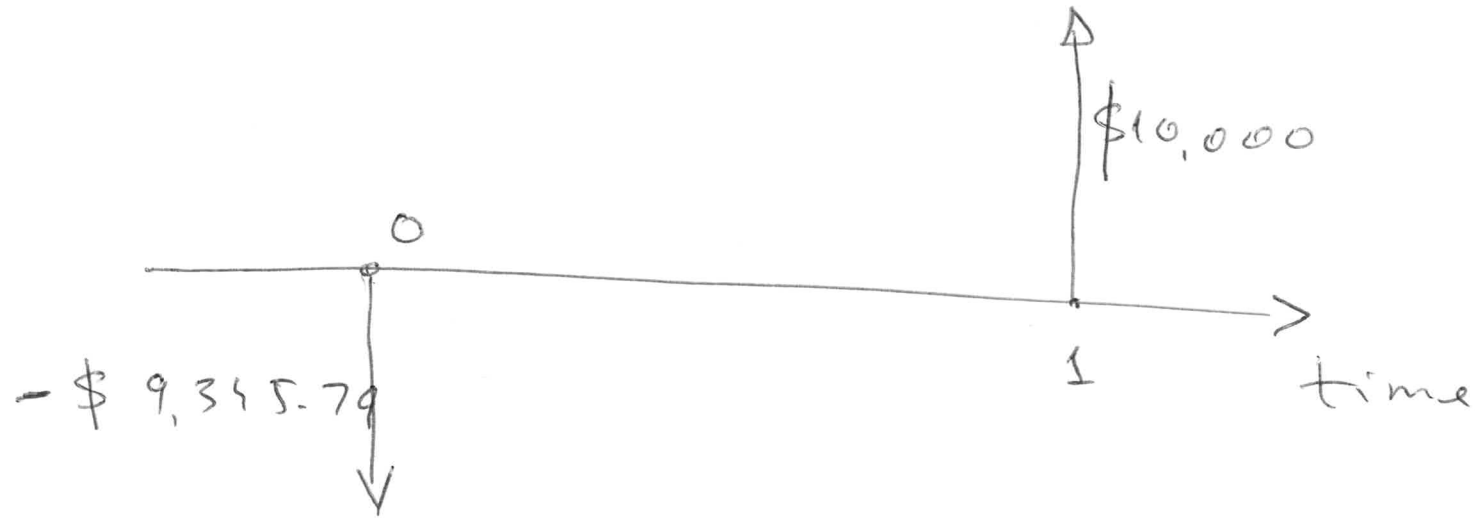

5% 1,050 —> $1,100.00
simple
PV
$1,000
compound interest
5%
$1,050 —> $1,102.50


+
−
FV
FV = PV(1+r)²
"bank"
PV
0
1
2 yrs
time
PV
"borrower"
0
2 yrs
time
FV

$$FV = PV(1+r)^n$$

$n = 1$, ~~PV~~ $FV = 10{,}000$ $r = 0.07 = 7\%$

$$PV = \frac{FV}{(1+r)^n} = \frac{10{,}000}{1+0.07}$$



$$FV = PV(1+r)^{\cancel{n}\ t}$$

"$n = t$"

$$(1+r)^t = \frac{FV}{PV}$$

$$1+r = \left(\frac{FV}{PV}\right)^{\frac{1}{t}}$$

$$r = \left(\frac{FV}{PV}\right)^{\frac{1}{t}} - 1$$