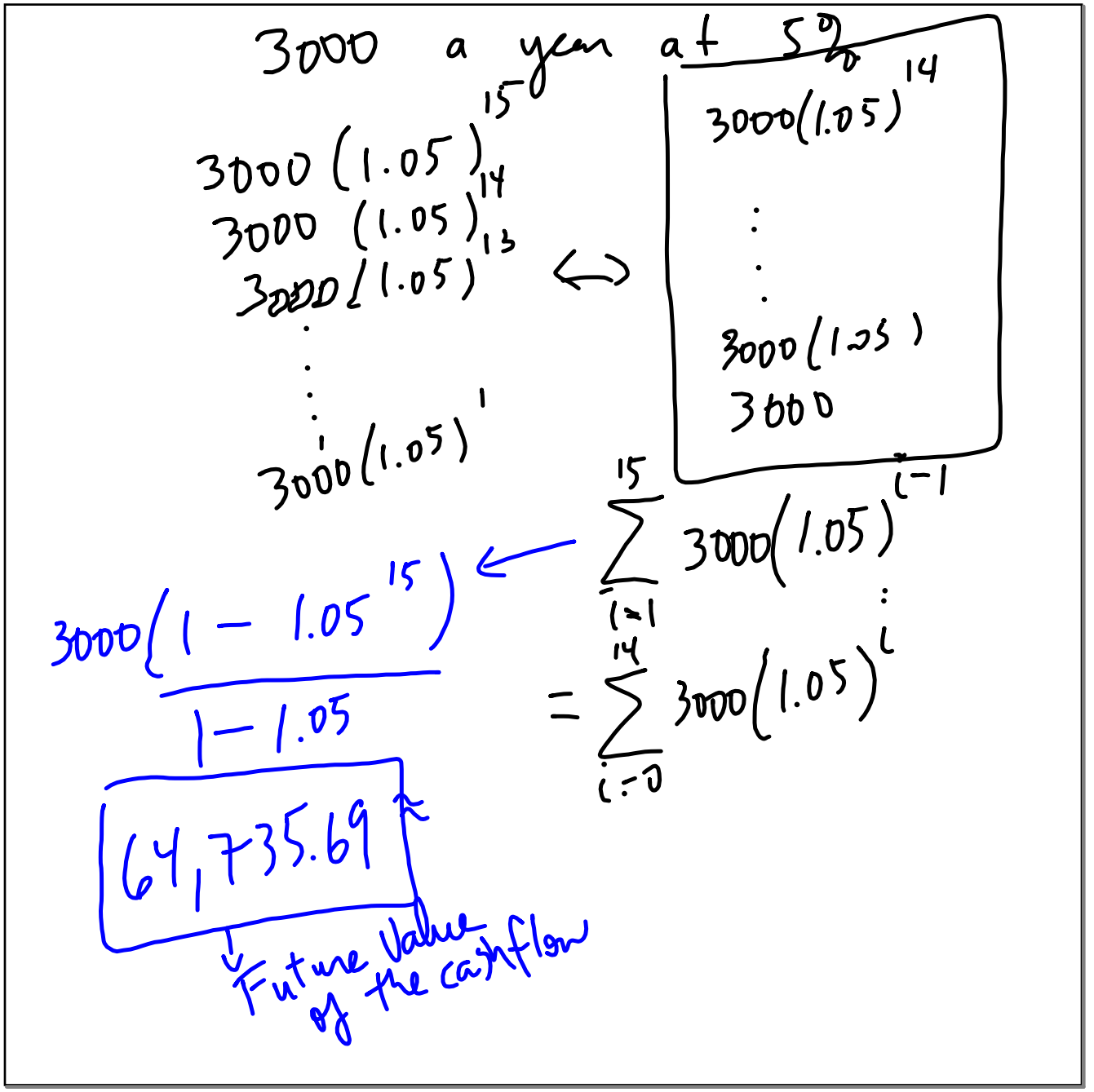
3000 a year at 5%
3000(1.05)^15
3000(1.05)^14
3000(1.05)^13
3000(1.05)^1
3000(1.05)^14
3000(1.05)^0
$\sum_{i=1}^{15} 3000(1.05)^{i-1}$
$= \sum_{i=0}^{14} 3000(1.05)^{i}$
$\frac{3000(1-1.05^{15})}{1-1.05}$
64,735.69
Future Value of the cashflow

$$\sum_{k=0}^{5} \frac{3}{2^k} = 3 + \frac{3}{2} + \frac{3}{2^2} + \frac{3}{2^3} + \frac{3}{2^4} + \frac{3}{2^5}$$

$r = \frac{1}{2}$ 6 terms.

$$= \frac{3\left(1 - \frac{1}{2}^6\right)}{1 - \frac{1}{2}} = \frac{3\left(1 - \frac{1}{64}\right)}{\frac{1}{2}}$$

$$= 3\left(\frac{63}{64}\right) \cdot 2$$

$$= 6\left(\frac{63}{64}\right) = 3\left(\frac{63}{32}\right) = \frac{189}{32}$$

$\left(\frac{1}{3}\right)^n = \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}, \frac{1}{243}, \cdots$

arithmetic

$a_n = a_1 + d(n-1)$

geometric

$g_n = g_1 r^{n-1}$

$\sum_{n=1}^{m} a_n = \sum_{n=1}^{20} \left(\frac{1}{3}\right)^n = \frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \frac{1}{3^4} \cdots$

Present Value vs Future Value

ex Say you invest 1000 at 4% for 10 years.

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

$$FV = 1000(1.04)^{10}$$

ex someone says they will give you $1000 in 10 years. How much is that worth today?

Concerns: interest / inflation = risk or uncertainty
value of $

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

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

discount factor ←

in general r is chosen by the person finding the present value.

set $r = 0.02$

ex Bonds - debt.

GE issue some bonds 5%.
semiannual.. for 10 years.

You can go buy GE $10,000.

10,000(2.5%) = 250 twice a year.

Year 1 | Year 2 | Year 3 ..... | Year 10
250, 250 | 250, 250 | 250, 250 | 250, 250 + 10,000.

assume risk free rate: 2%.

$$PV = \underbrace{\frac{250}{1.01} + \frac{250}{(1.01)^2}}_{\text{year 1}} + \frac{250}{}$$