Recursive

$a_n = 2a_{n-1} + 3a_{n-2}$

$a_1 = 1$

$a_2 = 3$

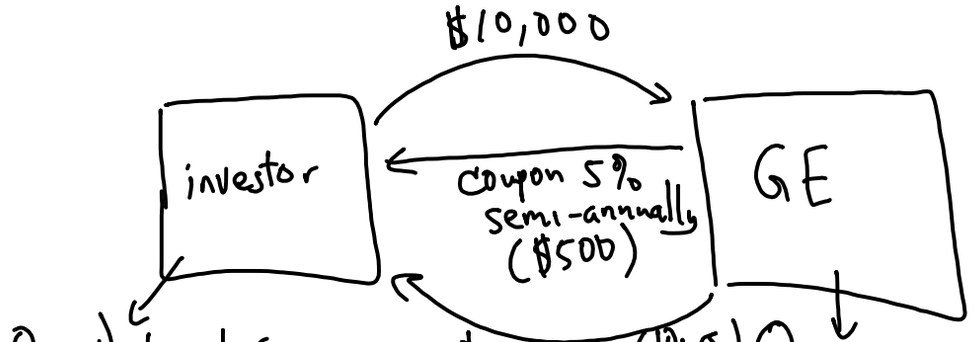
$a_3 = 2(3) + 3(1) = 9$

General term

find any term you like. immediately

$a_n = 2^n(n-1)$

$a_3 = 2^3(3-1) = 16$



Q: what return do I need, and how much risk do I take?

Q: who will lend to me? at what rate.

(guess)

Ex Say you think 4% is how much you can earn otherwise, (other investments)

then $PV_{GE} = \frac{500}{\left(1+\frac{0.04}{2}\right)} + \frac{500}{\left(1+\frac{0.04}{2}\right)^2} + \frac{500}{\left(1+\frac{0.04}{2}\right)^3} + \frac{500}{\left(1+\frac{0.04}{2}\right)^4}$

$$+ \cdots + \frac{500}{\left(1+\frac{0.04}{2}\right)^{20}} + \frac{10,000}{\left(1+\frac{0.04}{2}\right)^{20}}$$

$$\approx 14,981$$

$$PV = \left[500 \sum_{n=1}^{20} \left(\frac{1}{1+\frac{0.04}{2}}\right)^n\right] + 6729.71$$

$$= 500\left[\frac{1}{1.02}\left(\frac{1-\left(\frac{1}{1.02}\right)^{20}}{1-\left(\frac{1}{1.02}\right)}\right)\right] + 6729.71$$

$$= 8175.71 + 6729.71 = 14,905$$

Annuities (not exactly like the retirement product).

any investment (debt) that has a constant stream of cash.

- mortgage.
- car loan
- student loans.

- lottery payouts
- retirement annuity.