7.5 Annuities

An annuity is a type of account where you make regular payments in addition to receiving (or paying) interest on the principal.

Ex 1 Hans plans to invest $1000 at the end of each 6-month period in an annuity that earns 4.8%/a compounded semi-annually for the next 20 years. What will be the future value of his annuity?

1st 6month period: $1000
2nd 6month period: $1000+[1000+1000(0.024)]
3rd 6month period: $1000+[1000+1000(0.024)]+[1000+1000$(0.024)^2$]

Or

1st 6month period: $1000
2nd 6month period: $1000+[1000(1.024)]
3rd 6month period: $1000+[1000(1.024)]+[1000$(1.024)^2$]

In general, an annuity is a geometric series. $$FV = \frac{P((1+i)^n - 1)}{(1+i) - 1}$$

Where:

FV is future value,
P is payment,
i is interest rate per period,
n is number of periods.

Chie puts away $500 every 3 months at 5.2%/a compounded quarterly. How much will her annuity be worth in 25 years?

p.511#5,6,8
p.520#3,7

Day 2

Ex 2 Kew is going to invest some money now so that he can withdraw $1000 per year for the next 25 years. How much money does he need to invest?

$$PV = P\left(\frac{1-(1+i)^{-n}}{i}\right)$$

p.520#3,7