Math AA HL at KCA - Chapter 4 Notes

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1 Arithmetic Progressions

- $u_n = u_1 + (n-1)d$
- $S_n = \frac{n}{2}[a + L]$, where L is the given final term in the series
- $S_n = \frac{n}{2}[2a + (n-1)d]$
- $S_{k \text{ to } n} = S_n - S_{k-1}$

2 Geometric Progressions

- $r = \frac{u_{n+1}}{u_n}$
- $u_n = u_1 r^{n-1}$
- Convergent if and only if $-1 < r < 1$, otherwise divergent
- $S_n = \frac{a(1-r^n)}{1-r}$
- $S_\infty = \frac{a}{1-r}$ if and only if $-1 < r < 1$ (sequence converges)

3 Growth and Decay

$$u_n = u_0 \times r^n$$

- u_0 = initial amount
- r = growth/decay rate
- n = number of time periods
- u_n amount after n time periods

4 Simple Interest

Interest is calculated based on the initial amount; constant throughout

$$I = Prt$$

- I = interest paid
- P = principle; initial amount
- r = annual interest rate
- t = time in years

5 Compound Interest With GDC

$$FV = PV\left(1 + \frac{r}{100k}\right)^{kn}$$

- FV = future value
- PV = present value (negative **only in GDC** when borrowing, investing, depositing, etc.)
- k = number of compounding periods per year
- $r\%$ = compound interest rate

6 Inflation

Increasing prices of goods.

$$\text{indexed value} = PV \times r^n$$

- PV = current value
- r = rate of inflation (e.g. 1.04)

Inflation reduces the **real value** of an investment.

$$\text{real value} = \frac{FV}{r^n}$$

7 Depreciation

Loss in value.

$$u_n = u_0(1-d)^n$$

- u_n = depreciated value in n years
- u_0 = initial value
- d = rate of depreciation (e.g. $0.09 \equiv 9\%$)