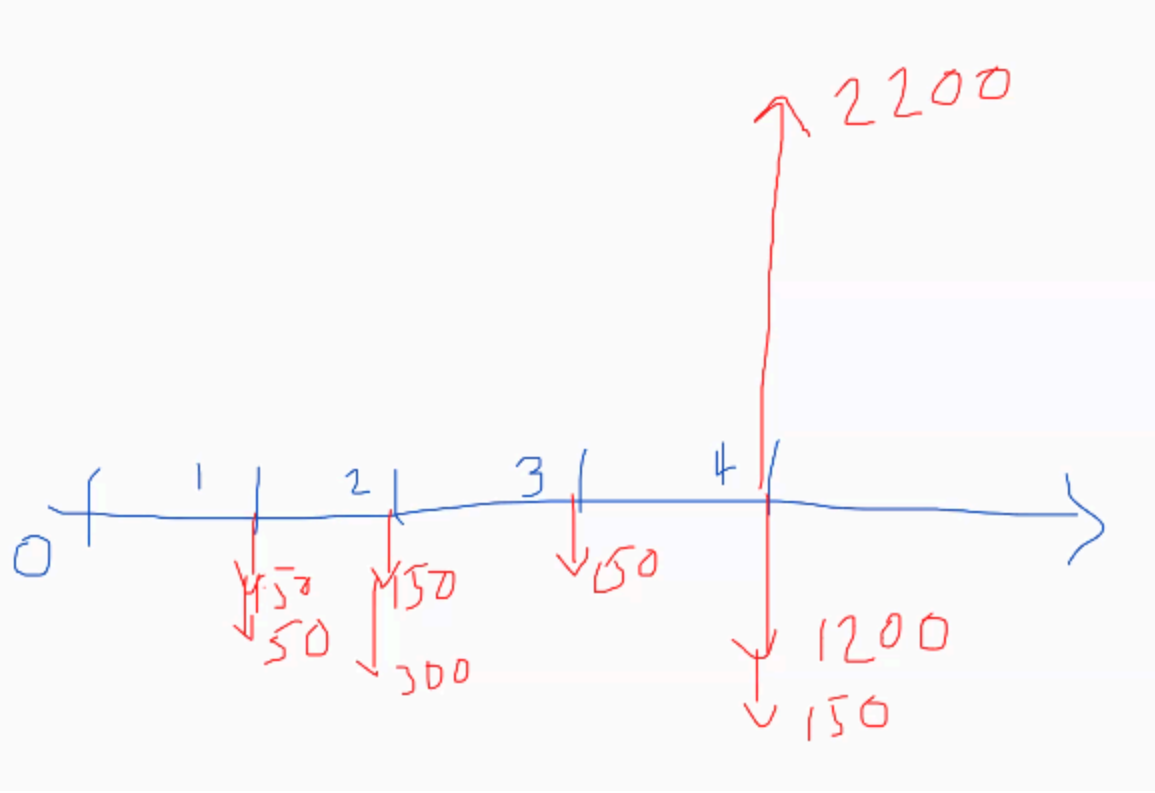
L4 APSC221 - Cash Flow Analysis

How to draw a cash flow diagram based on personal expenses:

- monthly income +2200
- rent -1200
- food per week -150
- cell phone bill -50
- credit card payment -300

1. Determine time period
   The most logical time period is weeks.
2. Draw line and hash marks for each period
3. Draw inflow lines up, downflow lines down
4. Don't subtract inflows and downflows



In cash flow diagrams, mathematical equivalency is used to compare different cash flows from an apples to apples basis.

Steps:

1. Draw a cash flow diagram for each options we are evaluating

2. Use mathematical equivalence to transfer all cash flows to a common point in time
3. Compare the options based on their equivalent values at the common point in time

For many cash flows, we can reduce the tediousness of transferring each cash flow by using **Compound Interest Factors**. This is a formulae defining the mathematical equivalence between common cash flow patterns, such as Single Cash Flows, Annuity Cash Flow Series, and Gradient Cash Flow series.

For a Single Cash Flow, use equation F = P(1+i)^n or rearrange to move backwards

General form: F = P(F/P, i, N)

Values of all compound interest factors have been calculated and presented in table format in **Interest Factor Tables**

Find interest factor using accurate n and F values from table.
Always keep to 4 decimal places until rounding the final solution.

For a Annuity Cash Flow Series, use:

Future Value of an Annuity: F = A(F/A, i, N)

An **annuity** is a **series of equal payments** (cash flows) made at **regular time intervals** for a **fixed number of periods**.

Sinking Fund Factor converts a future amount into an annuity:
(A/F, i, N)

Capital Recovery Factor converts a present amount into an annuity:
(A/P, i, N)

Uniform Series Factor converts an annuity into a future amount:
(F/A, i, N)

Series Present Worth Factor converts an annuity into a present amount:
(P/A, i, N)

If N goes to infinity only applies to annuities because it could go on forever.
Capitalized Value is the P value of an infinite series of cash flows

Apply lim -> inf to get P = i/A

Arithmetic Gradient Cash Flow

This cash flows series **starts at zero** and increases at a constant amount, G, from period to period.

Arithmetic Gradient to Annuity Factor converts an arithmetic gradient into an annuity: (A/G, i, N)

Arithmetic Gradient to Present Value converts an arithmetic gradient into a present value: (P/G, i, N)

Geometric Gradient Cash Flow

This cash flow series increases at a constant rate or percentage, into an exponential function. We can compute the mathematical equivalence using a **spreadsheet, not formulas**.

Non-Standard Cash Flows

If the compounding period is not the same as the payment period, we use spreadsheets to convert the sub-periods into an equivalent cash flows.

How do we deal with a cash flow which does not match to any of the cash flow series we know?

We can convert each individually or calculate them in chunks while finding known patterns (i.e. uniform series, linear gradient) within them.

Summary and Rules to Follow

Rules to Follow:

1. The present amount, P, of a future amount, F, occurs N periods earlier than F.
2. The future amount, F, of an annuity or gradient occurs at the last cash flow of the annuity or gradient.

- P denotes the present amount at the beginning of Period 1 (ie, Time Zero)
- Annuities have their first non-zero cash flow at the end of Period 1.
- Arithmetic gradients have their first non-zero cash flow at the end of Period 2.