

## Annuity and Perpetuity Calculations Summary

### I. Symbols

PV = Present value, what future cash flows are worth today

$FV_t$  = Future value, what cash flows are worth in the future at time  $t$

$r$  = Interest rate, rate of return, or discount rate per period—typically, but not always, one year

$t$  = Number of periods—typically, but not always, the number of years

$C$  = Cash amount

### II. Future value of $C$ invested per period for $t$ periods at $r$ percent per period

$$FV_t = C \times [(1 + r)^t - 1]/r$$

A series of identical cash flows paid for a set number of periods is called an annuity, and the term  $[(1 + r)^t - 1]/r$  is called the *annuity future value factor*.

### III. Present value of $C$ per period for $t$ periods at $r$ percent per period

$$PV = C \times \{1 - [1/(1 + r)^t]\}/r$$

The term  $\{1 - [1/(1 + r)^t]\}/r$  is called the *annuity present value factor*.

### IV. Present value of a perpetuity of $C$ per period

$$PV = C/r$$

A perpetuity has the same cash flow every period forever.