Present Value of an Annuity

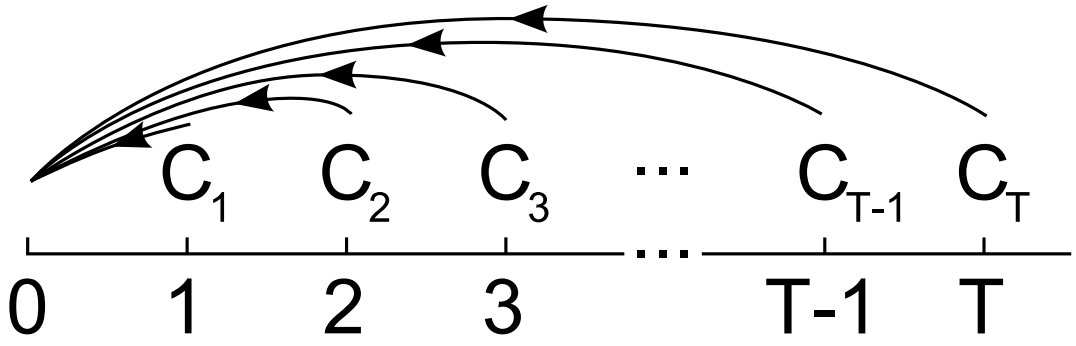
$$\boldsymbol{PV[annuity] = V_0 = \frac{C_1}{r}\left(1 - \frac{1}{(1+r)^T}\right)}$$

Where:

C_1 = the cash flow received at $t = 1$ and every period after until the last cash flow at $t = T$. All cash flows are equal to C_1, they don't grow.

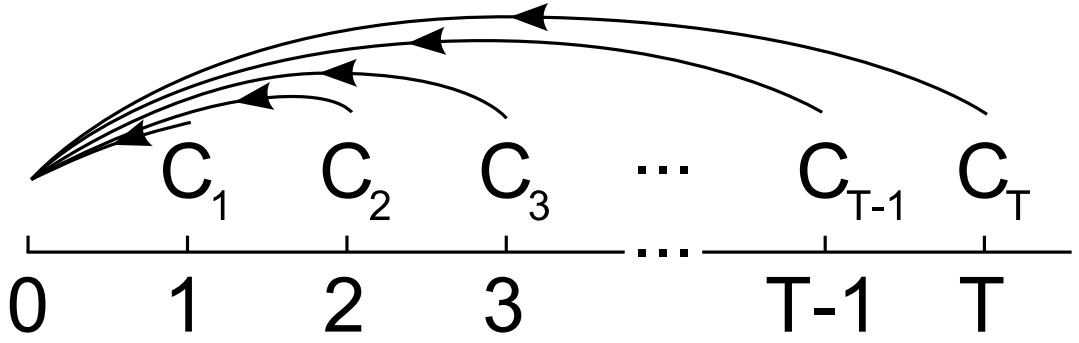
T = the number of cash flows. Some people prefer to use 'n' rather than 'T'.

r = the effective rate over a single period.



$$PV[annuity] = V_0 = \frac{C_1}{r}\left(1 - \frac{1}{(1+r)^T}\right)$$

Note that C_1 is used instead of C to remind you that the first cash flow is 1 period ahead of the present value V_0. The annuity formula does not include a cash flow at $t = 0$.



Calculation Example: Present Value of an Annuity

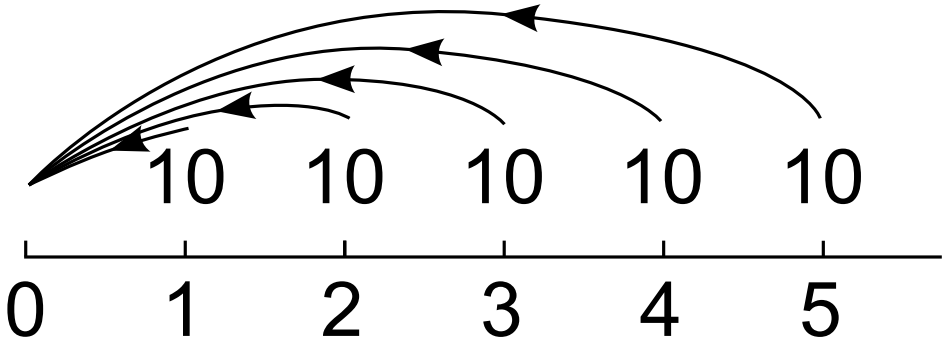
Question: What is the value of receiving $10 for the next 5 years with the first payment one year from now? The interest rate is 10% pa.

Answer:

$$V_0 = \frac{C_1}{r}\left(1 - \frac{1}{(1+r)^T}\right)$$

$$= \frac{10}{0.1}\left(1 - \frac{1}{(1+0.1)^5}\right)$$

$$= 37.9079$$



Questions: Annuities

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