***Present Value of an Annuity***

$$PV[annuity]=V\_{0}=\frac{C\_{1}}{r}\left(1-\frac{1}{\left(1+r\right)^{T}}\right)$$

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.

$$PV[annuity]=V\_{0}=\frac{C\_{1}}{r}\left(1-\frac{1}{\left(1+r\right)^{T}}\right)$$

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 $t=0$.

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***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**:

$$V\_{0}=\frac{C\_{1}}{r}\left(1-\frac{1}{\left(1+r\right)^{T}}\right)$$

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

$$ =37.9079$$

***Questions: Annuities***

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