Important Present Value Formulas PDF

Formulas
Examples
with Units

List of 19
Important Present Value Formulas

1) Annuity Due for Present Value Formula

Evaluate Formula

Formula

$$PV_{AD} = PMT \cdot \left(\frac{1 - \left(\frac{1}{(1 + r)^{n_{Periods}}} \right)}{r} \right) \cdot (1 + r)$$

Example

$$117.1429 = 60 \cdot \left(\frac{1 - \left(\frac{1}{(1 + 0.05)^{2}} \right)}{0.05} \right) \cdot (1 + 0.05)$$

2) Growing Annuity Payment using Present Value Formula

Evaluate Formula

Formula

$$PMT_{initial} = PV \cdot \left(\frac{r - g}{1 - \left(\left(\frac{1 + g}{1 + r} \right)^{n_{Periods}} \right)} \right)$$

Example

$$53.2609 = 100 \cdot \left(\frac{0.05 - 0.02}{1 - \left(\left(\frac{1 + 0.02}{1 + 0.05} \right)^{2} \right)} \right)$$

3) Number of Periods using Present Value of Annuity Formula

Evaluate Formula

Formula

$$t = \frac{\ln\left(\left(1 - \left(\frac{PVAnnuity}{C_f} \right) \right)^{-1} \right)}{\ln(1 + r)}$$

Example

$$74.2843 = \frac{\ln\left(\left(1 - \left(\frac{1460}{1500} \right) \right)^{-1} \right)}{\ln(1 + 0.05)}$$

4) Present Value Continuous Compounding Factor Formula

Evaluate Formula

Formula

$$F_{PV} = \left(e^{-r \cdot t} \right)$$

Example

$$0.6703 = \left(e^{-0.05 \cdot 8} \right)$$

5) Present Value Factor Formula

Evaluate Formula

Formula

$$F_{PVA} = \frac{1 - \left(\left(1 + r \right)^{-n_{Periods}} \right)}{r}$$

Example

$$1.8594 = \frac{1 - \left(\left(1 + 0.05 \right)^{-2} \right)}{0.05}$$

6) Present Value for Continuous Compounding Formula

Evaluate Formula

Formula

$$PV_{cc} = \frac{FV}{e^{r \cdot n_{Periods}}}$$

Example

$$29859.6348 = \frac{33000}{e^{0.05 \cdot 2}}$$

7) Present Value of Annuity Formula

Evaluate Formula

Formula

$$PVAnnuity = \left(\frac{p}{IR} \right) \cdot \left(1 - \left(\frac{1}{\left(1 + IR \right)^{n_{Months}}} \right) \right)$$

Example

$$5090.9091 = \left(\frac{28000}{5.5} \right) \cdot \left(1 - \left(\frac{1}{\left(1 + 5.5 \right)^{13}} \right) \right)$$

8) Present Value of Annuity with Continuous Compounding Formula

Evaluate Formula

Formula

$$PVAnnuity = C_f \cdot \left(\frac{1 - e^{-r \cdot n_{Periods}}}{e^{r} - 1} \right)$$

Example

$$2784.1003 = 1500 \cdot \left(\frac{1 - e^{-0.05 \cdot 2}}{e^{0.05} - 1} \right)$$

9) Present Value of Deferred Annuity Formula

Evaluate Formula

Formula

$$PV_{DA} = P_O \cdot \frac{1 - \left(1 + \left(IR \cdot 0.01 \right) \right)^{-n_{Periods}}}{\left(1 + \left(IR \cdot 0.01 \right) \right)^{t_d} \cdot \left(IR \cdot 0.01 \right)}$$

Example

$$253.869 = 2500 \cdot \frac{1 - \left(1 + \left(5.5 \cdot 0.01 \right) \right)^{-2}}{\left(1 + \left(5.5 \cdot 0.01 \right) \right)^{9} \cdot \left(5.5 \cdot 0.01 \right)}$$

10) Present Value of Deferred Annuity based on Annuity Due Formula

Evaluate Formula

Formula

$$PV_{DA} = P_D \cdot \frac{1 - \left(1 + \left(IR \cdot 0.01\right)\right)^{-n_{Periods}}}{\left(1 + \left(IR \cdot 0.01\right)\right)^{t_d - 1} \cdot \left(IR \cdot 0.01\right)}$$

Example

$$132.3366 = 110 \cdot \frac{1 - \left(1 + \left(5.5 \cdot 0.01\right)\right)^{-2}}{\left(1 + \left(5.5 \cdot 0.01\right)\right)^{9 - 1} \cdot \left(5.5 \cdot 0.01\right)}$$

11) Present Value of Future Sum given compounding periods Formula

Evaluate Formula

Formula

$$PV = \frac{FV}{\left(1 + \left(\frac{\%RoR}{C_n}\right)\right)^{C_n \cdot n_{Periods}}}$$

Example

$$17.4524 = \frac{33000}{\left(1 + \left(\frac{4.5}{11}\right)\right)^{11 \cdot 2}}$$

12) Present Value of Future Sum given Number of Periods Formula

Evaluate Formula

Formula

$$PV = \frac{FV}{\exp\left(\%RoR \cdot n_{Periods}\right)}$$

Example

$$4.0725 = \frac{33000}{\exp\left(4.5 \cdot 2\right)}$$

13) Present Value of Future Sum given Total Number of Periods Formula

Evaluate Formula

Formula

$$PV = \frac{FV}{\left(1 + IR\right)^{t}}$$

Example

$$0.0104 = \frac{33000}{\left(1 + 5.5\right)^{8}}$$

14) Present Value of Growing Annuity Formula

Evaluate Formula

Formula

$$PV_{ga} = \left(\frac{II}{r - g}\right) \cdot \left(1 - \left(\frac{1 + g}{1 + r}\right)^{n_{Periods}}\right)$$

Example

$$3755.102 = \left(\frac{2000}{0.05 - 0.02}\right) \cdot \left(1 - \left(\frac{1 + 0.02}{1 + 0.05}\right)^{2}\right)$$

15) Present Value of Lumpsum Formula

Evaluate Formula

Formula

$$PV_L = \frac{FV}{\left(1 + IR_P\right)^{n_{Periods}}}$$

Example

$$29369.8825 = \frac{33000}{\left(1 + 0.06\right)^{2}}$$

16) Present Value of Ordinary Annuities and Amortization Formula

Evaluate Formula

Formula

$$PV = PMT \cdot \left(\frac{1 - \left(1 + r\right)^{-n_c}}{r}\right)$$

Example

$$593.9185 = 60 \cdot \left(\frac{1 - \left(1 + 0.05\right)^{-14}}{0.05}\right)$$

17) Present Value of Stock with Constant Growth Formula

Evaluate Formula

Formula

$$P = \frac{D1}{\left(\%RoR \cdot 0.01\right) - g}$$

Example

$$10 = \frac{0.25}{\left(4.5 \cdot 0.01\right) - 0.02}$$

18) Present Value of Stock with Zero Growth Formula

Evaluate Formula

Formula

$$P = \frac{D}{\%RoR}$$

Example

$$7.7778 = \frac{35}{4.5}$$

19) PV of Perpetuity Formula

Evaluate Formula

Formula

$$PV_p = \frac{D}{DR}$$

Example

$$291.6667 = \frac{35}{0.12}$$

Variables used in list of Present Value Formulas above

- **%RoR** Rate of Return
- C_f Cashflow per Period
- C_n Compounding Periods
- **D** Dividend
- **D1** Estimated Dividends for Next Period
- **DR** Discount Rate
- F_{PV} PV Continuous Compounding Factor
- F_{PVA} Annuity Present Value Factor
- **FV** Future Value
- **g** Growth Rate
- **II** Initial Investment
- **IR** Interest Rate
- IR_P Interest Rate per Period
- n_c Total Number of Times Compounded
- n_{Months} Number of Months
- $n_{Periods}$ Number of Periods
- **p** Monthly Payment
- **P** Price of Stock
- P_D Annuity Payment Due
- P_O Ordinary Annuity Payment
- **PMT** Payment made in Each Period
- $PMT_{initial}$ Initial Payment
- **PV** Present Value
- PV_{AD} Annuity Due Present Value
- PV_{cc} Present Value with Continuous Compounding
- PV_{DA} Present Value of Deferred Annuity
- PV_{ga} Present Value of Growing Annuity
- PV_L Present Value of Lumpsum
- PV_p PV of Perpetuity
- **PVAnnuity** Present Value of Annuity
- **r** Rate per Period
- **t** Total Number of Periods

Constants, Functions, Measurements used in list of Present Value Formulas above

- constant(s): **e**, 2.71828182845904523536028747135266249 *Napier's constant*
- Functions: **exp**, exp(Number) *n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.*
- Functions: **ln**, ln(Number) *The natural logarithm, also known as the logarithm to the base e, is the inverse function of the natural exponential function.*

- t_d Deferred Periods

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