Documentation

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The FinancialPy package is installed using import. Each function can be called using finpy.functionname().

**Instructions**

Remember to use a number between 0 and 1 for any rate, and that all calculations must be done in the same time units. For example, if the cash flows are received annually, the rate must be annualized.

**List of Functions:**

* pv\_one()
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**Function: pv\_one(fv, rate, periods)**

Inputs:

* fv- future value of the investment
* rate- the rate at which interest is compounded
* periods- the number of time periods the investment will be held for

Use case: The future value of an investment is known, and the present value is needed for comparison to another investment or to determine the amount of the initial investment.

Example: In 5 years, you want to have $10,000. If the value is compounded at a rate of 10%, you must invest $6,209.21 today to reach the desired value.

**Function: fv\_one(pv, rate, periods)**

Inputs:

* pv- present value of the investment
* rate- the rate at which interest is compounded
* periods- the number of time periods the investment will be held for

Use case: You plan to invest a certain amount of money today, and hold for a predetermined period of time. Given a compound interest rate, what is the value of the investment at the end of the period.

Example: You plan to invest $1,000 at a rate of 10%. In 5 years, the investment will be worth $1,210.

**Function: pv\_ordinary\_annuity(pmt, rate, periods)**

Inputs:

* pmt- payment
* rate- the rate at which interest is compounded
* periods- the number of time periods the investment will be held for

Use case: Given a payment amount that is scheduled for a finite number of periods, and the rate of interest, what is the current value of that investment.

Example: You can receive $1 million per year for 30 years. If the interest rate is 8%, the present value of the investment is 11.26 million.

**Function: fv\_ordinary\_annuity(pmt, rate, periods)**

Inputs:

* pmt- payment
* rate- the rate at which interest is compounded
* periods- the number of time periods the investment will be held for

Use case: Given a payment amount that is scheduled for a finite number of periods, and the rate of interest, what will the value of the investment be at the end of the periods.

Example: For 30 years, you will invest $10,000. If the interest rate is 10%, there will be $1,644,940.23 in the account after 30 years.

**Function: pv\_annuity\_due(pmt, rate, periods)**

Inputs:

* pmt- payment
* rate- the rate at which interest is compounded
* periods- the number of time periods the investment will be held for

Use case: This determines the annual investment needed given the desired annual payout, interest rate, and number of years you will invest for.

Example: If you want to be paid $1,000 annually, the interest rate is 5% and you will invest for 10 years before payouts begin, you will need to invest $8,107.82 a year.

**Function: fv\_annuity\_due(pmt, rate, periods)**

Inputs:

* pmt- payment
* rate- the rate at which interest is compounded
* periods- the number of time periods the investment will be held for

Use case: Given annual investments for a finite number of years that will compound interest at a given rate, you can determine your annual payout once investing is complete.

Example: If you invest $1,200 annually for 6 years and the interest rate is 8%, you will have an annual payout of $9,507.36.

**Function: growing\_annuity(initial\_cash\_flow, rate, growth\_rate, periods)**

Inputs:

* initial\_cash\_flow- the amount of the initial cash flow received
* rate- the rate at which interest is compounded
* growth\_rate- the constant rate at which the cash flows are expected to grow
* periods- the number of time periods the investment will be held for

Use case: Annual investments will be made that increase at a constant rate for a finite amount of time, and the future value of the investment is needed.

Example: You plan to invest $12,000 and increase that annual payment by 3% annually for 45 years. Given a compound rate of 8%, the account will have $211,567.35 after 45 years.

**Function: perpetuity(cash\_flow, rate)**

Inputs:

* cash\_flow- the amount of the cash flow that will be received
* rate- the rate at which interest is compounded

Use case: There is a cash flow that you will receive in perpetuity.

Example: A cash flow of $30,000 will be received, and with a rate of 8%, the value will be $375,000

**Function: growing\_perpetuity(initial\_cash\_flow, rate, growth\_rate)**

Inputs:

* initial\_cash\_flow- the amount of the initial cash flow received
* rate- the rate at which interest is compounded
* growth\_rate- the constant rate at which the cash flows are expected to grow

Use case: There is an annual payment that is expected to grow at a constant rate forever.

Example: You have an annual cash inflow of $200,000, and it is expected to grow at a rate of 2% indefinitely. Given a rate of 7%, the value is $4 million.

**Function: cash\_flow\_analysis(initial\_investment, cash\_flows, discount\_rate)**

Inputs:

* initial\_investment- the amount invested at time 0
* cash\_flows- the cash flows received, in list form
* discount\_rate- the rate at which the cash flows will be discounted to account for the time value of money

Use case: You want to determine the net present value of an initial investment given the promise of a number of payments in the future.

Example: If you invest $1,000 today, you will receive three annual payments of $500. With an interest rate of 10%, the NPV is $243.43.

**Function: payback\_period(initial\_investment, annual\_cash\_flow)**

Inputs:

* initial\_investment- the amount invested at time 0
* annual\_cash\_flow- the cash flows received each year, in list form
* discount\_rate- the rate at which the cash flows will be discounted to account for the time value of money

Use case: You want to determine how many periods will it take to repay your initial investment.

Example: If you invest $10,000 today, you will receive payments of $4,000 annually. With an interest rate of 10%, it will take 2.5 years to pay back the initial investment.

**Function: probability\_index(initial\_investment, cash\_flow, discount\_rate)**

Inputs:

* initial\_investment- the amount invested at time 0
* cash\_flows- the cash flows received, in list form
* discount\_rate- the rate at which the cash flows will be discounted to account for the time value of money

Use case: You want to determine the profitability index, which is the total present value of future cash flows as a percentage of the initial investment, to determine which investment is best.

Example: If you invest $150 today, you will receive payments of $50, $100, and $150 for the next three years. With an interest rate of 10%, the profitability index is 1.61.

**Function: annuity\_payment(principal, rate, periods)**

Inputs:

* Principal- the initial amount borrowed
* rate- the rate at which interest is compounded
* Periods- number of payments intended to be made

Use case: The borrower wishes to calculate the amount each payment needs to be, given that they choose the number of payments.

Example: $60,000 is borrowed, with an annual interest rate of 3%. If the borrower wants to make 60 monthly payments, they will have to pay $1,078.12 each month. Note that the interest rate and time period must be in the same units, so the interest rate must be converted.

**Function: total\_interest\_paid(loan\_payment, num\_payments, principal)**

Inputs:

* loan\_payment- the amount each payment will be
* num\_payments- the number of payments made
* principal- the initial loan amount

Use case: The borrower wishes to calculate the amount of interest they will pay in total, given a period payment amount and finite number of payments.

Example: If $3,600 was borrowed, and the borrower will make 6 payments of $1,000, then $2,400 of interest will be paid overall.

**Function: total\_payments(loan\_payment, num\_payments)**

Inputs:

* loan\_payment- the amount each payment will be
* num\_payments- the number of payments made

Use case: The borrower wishes to calculate the amount they will pay in total, given a period payment amount and finite number of payments.

Example: If the borrower will make 6 payments of $10,000, then $60,000 will be paid overall.