

FINANCIAL MATH FORMULAS

JOHN ADAMSKI

ABSTRACT. Some important formulas.

1. SIMPLE INTEREST

Used by default for short-term loans/investments.

- I = interest
- P = principal
- r = annual interest rate (decimal)
- t = time (years)
- A = account balance/future value

$$I = Prt$$

$$A = P + I = P(1 + rt)$$

2. COMPOUND INTEREST

- P = principal
- r = annual interest rate (decimal)
- n = number of compound periods per year
- t = time (years)
- A = account balance/compound amount
- r_E = effective rate/annual percentage yield (APY)

$$A = P \left(1 + \frac{r}{n}\right)^{nt} = P(1 + r_E)^t$$

$$r_E = \left(1 + \frac{r}{n}\right)^n - 1$$

3. FUTURE VALUE OF AN ANNUITY

An **ordinary annuity** is a sequence of equal size payments made into an account earning compound interest at the end of each payment/compound period. The term **annuity due** means that payments are made at the *beginning* of each payment/compound period.

- S_n = future value of annuity
- n = total number of payment periods
- R = recurring payment
- i = interest rate per payment/compound period
- D_n = future value of annuity due

$$S_n = \frac{R[(1+i)^n - 1]}{i}$$

$$D_n = S_{n+1} - R$$

4. PRESENT VALUE OF AN ANNUITY

- P = present value of annuity
- n = total number of payment periods
- R = recurring payment
- i = interest rate per payment/compound period

$$P = \frac{R[1 - (1+i)^{-n}]}{i}$$

DEPARTMENT OF MATHEMATICS, FORDHAM UNIVERSITY

Email address: jadamski1@fordham.edu

URL: www.johnadamski.com