8.5 – Amortization & Loans

Amortized Loans – Lender loans a borrower a lump sum of money. The borrower pays back that amount plus any interest charged by making equal payments at regular intervals.

$$PMT = \frac{P\left(\frac{r}{n}\right)}{\left[1-\left(1+\frac{r}{n}\right)^{-nt}\right]}$$

P = Principal of loan or Present Value
PMT = Amount of each payment
r = Annual Interest Rate (in decimal form)
n = Number of periods per year
t = Time (in years)
Payments are made at the end of each compounding period.

This formula can only be used if the number of payments per year is equal to the number of compounding periods in a year. A different formula would be needed if these are not equal

Points are a one-time charge made at closing of a mortgage. One point equals 1% of the loan value. Customers can often pay more points to get a lower interest rate.

Examples

Determine the amount of a loan (*P*) if borrower can afford a known payment (*PMT*). Solving for *P* in the amortization formula gives

$$P = \frac{PMT\left[1-\left(1+\frac{r}{n}\right)^{-nt}\right]}{\left(\frac{r}{n}\right)}$$

Example

Amortization Schedules – Table for a loan that breaks down the amount of each payment that goes towards interest and the amount that goes to paying down the principal.

You want to get a loan for $2000 at 6% compounded semiannually in which you make equal payments and pay off the loan in 3 years.

First Find Payment:

Part of each payment will go to play off interest that has accrued during that period while the rest pays down the principal.