# Analyzing Loans

If you want to determine the *present value* of a series of future payments or withdrawals, then the following formula can be used. Note that the formula requires the regular payments to have the same frequency as the compounding interest.

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

PV = present value
R = regular payment amount
n = number of compounding periods per year
r = interest rate per year
t = time in years

## Example 1:

Matt is renovating his kitchen and has negotiated a loan at 4.9%, compounded quarterly, with regular payments of $2000 every three months. He plans to repay the loan in three years.

a. What is the most that Matt can borrow?
b. How much interest will Matt pay?

### Solution:

## Example 2:

At the beginning of a four-year university degree, Claire has $30 125 in an account that earns 2.3% compounded monthly. If no further deposits are made to the account, and she withdraws an equal amount every month for the next four years, how much would this withdrawal amount be if the balance in the account at the end of the four years is zero?

### Solution:

## Example 3:

Jose is negotiating with his bank for a mortgage on a house. He has been told that he needs to make a 10% down payment on the purchase price of $225 000. The bank will offer a mortgage loan for the balance at 3.75%, compounded monthly, with monthly mortgage payments and a term of 20 years.

a. How much will each payment be?
b. How much will he pay altogether?
c. What will be the balance on the mortgage after 5 years?
d. If Jose was allowed to borrow the $225 000, with no down payment, under the terms stated above, and pay off the loan in a single payment at the end of the 20 years, how much would he have to pay?

### Solution: