

The present value of an annuity is the amount that would be deposited today in order to yield the same balance at the end of the term as iterated payments.

Example 1 :

Suppose \$1000 is deposited ^{semi-}annually at 8% interest for 10 years at 8% interest, compounded semi-annually. The future value of this annuity, from Friday, is

$$A = 1000 \left[\frac{(1.04)^{20} - 1}{.04} \right] = \$29,778.08$$

Note that a total of \$20,000 is deposited.

From Wednesday, we know to achieve \$29,778.08 in 10 years at 8% interest compounded semiannually, we need

$$P = \frac{A}{(1.04)^{20}} = \$13,596.33$$

if no deposits or withdrawals are made.

Consider how we got this number. We combined two formulas $A = R \left[\frac{(1+i)^n - 1}{i} \right]$ and

$$P = \frac{A}{(1+i)^n}$$

to get the principal, P , to

deposit. From this, it is clear that

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

Example 2:

Suppose I want a car, but I need to borrow \$13,000 to pay for it. I get 4% on a five year loan. What are my monthly payments? (assume monthly compounding)

$$13000 = R \left[\frac{1 - \left(1 + \frac{.04}{12}\right)^{12 \cdot 5}}{.04/12} \right]$$

$$R = \$239.41$$

A loan is amortized is the interest and the principal are paid in equal periodic payments.

To simplify,

$$R = \frac{P_i}{1 - (1+i)^{-n}}$$

Note that the balance does not decrease at an even rate.

Example 3:

After 15 payments, I get some inheritance and can pay off my car loan. How much do

1 need to pay?

method 1: $60 - 15 = 45$ payments remain
(\$239.41 each.) the present value of the
annuity represented by these 45 payments
is

$$239.41 \left[\frac{1 - \left(1 + \frac{.04}{12}\right)^{-45}}{.04/12} \right] = \$9988.95$$

method 2: We already have 15 payments,

$$239.41 \left[\frac{1 - \left(1 + \frac{.04}{12}\right)^{-15}}{.04/12} \right] = \$3497.17$$

has already been paid. Thus \$9502.82
is still owed, but interest is owed on this,

$$9502.82 \left[1 + \frac{.04}{12} \right]^{15} = \$9989.21$$

is the amount that needs to be paid
now.

Note there is a slight difference in these
numbers. It is due to rounding error. Banks
can't have this, and have amortization tables
to tell them (and their customers), how much
is still due.

On the project,

1100 tested positive with your test +
695 with the old test

of these 695

121 tested positive with your test

105 have breast cancer

63 have breast cancer and tested
positive with your test.

HW# 11

5.2 53, 68, 69

5.3 ~~59, 66, 69~~

58, 59, 60, 66, 69