

(8) General equation. The following equation sets forth the relationship among the terms of a transaction:

$$\frac{A}{1} + \frac{A}{(1+i)^2} + \dots + \frac{A}{(1+i)^m} =$$

$$\frac{1}{(1+i)^1} + \frac{1}{(1+i)^2} + \dots + \frac{1}{(1+i)^m}$$

$$\frac{P}{(1+i)^1} + \frac{P}{(1+i)^2} + \dots + \frac{P}{(1+i)^n}$$

(9) Solution of general equation by iteration process. (i) The general equation in paragraph (b)(8) of this section, when applied to a simple transaction in which a loan of \$1000 is repaid by 36 monthly payments of \$33.61 each, takes the special form:

$$A = \frac{33.61 \ddot{a}_{\overline{36}|}}{(1+i)}$$

Step 1: Let I_1 = estimated annual percentage rate = 12.50 %

Evaluate expression for A, letting $i = I_1 / (100w) = .010416667$

Result (referred to as A') = 1004.674391

Step 2: Let $I_2 = I_1 + .1 = 12.60 %$

Evaluate expression for A, letting $i = I_2 / (100w) = .010500000$

Result (referred to as A'') = 1003.235366

Step 3: Interpolate for I (annual percentage rate):

$$I = I_1 + .1 \left[\frac{(A - A')}{(A'' - A')} \right]$$

$$= 12.50 + .1 \left[\frac{(1000.000000 - 1004.674391)}{(1003.235366 - 1004.674391)} \right] = 12.82483042 %$$

Step 4: First iteration, let $I_1 = 12.82483042 %$ and repeat

Steps 1, 2, and 3 obtaining a new $I = 12.82557859 %$

Second iteration, let $I_1 = 12.82557859 %$ and repeat

Steps 1, 2, and 3 obtaining a new $I = 12.82557529 %$

In this case, no further iterations are required to obtain the annual percentage rate correct to two decimal places, 12.83%.