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

$$\frac{A_1}{(1+e_1 i)(1+i)^{q_1}} + \frac{A_2}{(1+e_2 i)(1+i)^{q_2}} + \ldots + \frac{A_m}{(1+e_m i)(1+i)^{q_m}} =$$

$$\frac{P_1}{(1+f_1 i)(1+i)^{t_1}} + \frac{P_2}{(1+f_2 i)(1+i)^{t_2}} + \ldots + \frac{P_n}{(1+f_n i)(1+i)^{t_n}}$$

(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%.