Exercise AP-105

Present values of several individual payments

The Economic Skills Project

1 Problem

Problem

What are the present values in year 0 of each of the following payments (that is, the individual PVs) when the interest rate is 5%? Round to the nearest dollar.

2 Answer

Answer

Here's the solution:

3 Method

Solution method

Here's one approach:

Case	Payment	Year
A	$2,000	10
B	-$700	5
C	$300	1
D	-$5,000	7

Case	Payment	Year	PV
A	$2,000	10	$1,228
B	-$700	5	-$548
C	$300	1	$286
D	-$5,000	7	-$3,553

1. Draw the cash flow diagram for a payment of F_t dollars in year t.

2. Write down the corresponding single-payment PV formula.

3. Apply it to each case.

4 Solution

4.1 Step 1

Cash flow diagram for F_t in year t

Each of the payments is an amount of money, F_t, that occurs in a specified year, t. The corresponding cash flow diagram looks like this:

4.2 Step 2

The single-payment PV formula

The present value formula corresponding to the cash flow in the diagram is:

$$PV = \frac{F_t}{(1+r)^t}$$

The result, PV, is the amount of money that would need to be deposited in a bank in year 0 in order for the account to grow (through the accumulation of compounding interest) to F_t dollars at year t.

4.3 Step 3

Applying the formula

Case A:
$$\frac{\$2000}{1.05^{10}} = \$1228$$

Case B:
$$\frac{-\$700}{1.05^{5}} = -\$548$$

Case C:
$$\frac{\$300}{1.05^{1}} = \$286$$

Case D:
$$\frac{-\$5000}{1.05^{7}} = -\$3553$$

Done!