Exercise AP-121

Present value of an infinite stream of payments

The Economic Skills Project

1 Problem

Problem

A philanthropist wishes to establish a trust fund in year 0 that would provide a nonprofit organization with an annual income of $200,000 per year forever. The first payment would occur in year 1. How large would the initial deposit have to be if the trust fund was expected to earn 4% interest a year?

2 Answer

Answer

- $5 million

3 Method

Solution method

Here's one approach:

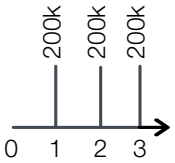
1. Draw the cash flow diagram for the project.
2. Apply the PV formula for an infinite stream beginning in one year.

4 Solution

4.1 Step 1

Cash flow diagram

The cash flow diagram for payments from the trust fund is shown below. Note that there is no payment in year 0.



4.2 Step 2

Apply the PV formula for an infinite stream

The present value of payment F dollars every year (starting in year 1) when the interest rate is r is:

$$PV = \frac{F}{r}$$

Applying that gives:

$$PV = \frac{\$200,000}{0.04} = \$5M$$

Done!