1. How much would you be willing to pay today for the opportunity to receive $10,000 every year forever if the interest rate is 5% per year? (Assume you can bequest it to someone else). Round your final answer to the nearest dollar.

   Answer:

   The correct answer is **200,000**.

   In this problem you are asked to calculate the present value (PV) of a perpetuity.

   Recall that $V_0 = C/r$

   where V_0 is the present value of the cash flows, C is the constant payment, and r is the interest rate per period.

   Since we have C = 10,000 and r = 0.05,

   $V_0 = \$10000/0.05 = \$200,000$

2. How much would you be willing to pay today for the opportunity to receive $1000 every month forever if the interest rate is 5% per year? (Assume you can bequest it to someone else). Round off your final answer to the nearest dollar.

   Answer:

   The correct answer is **240,000**.

   In this problem you are asked to calculate the present value (PV) of a perpetuity.

   Recall that $V_0 = C/r$

   where V_0 is the present value of the cash flows, C is the constant payment, and r is the interest rate per period.

   Notice however that we need to find the monthly interest rate since the payments are monthly. Therefore, we have r = 0.05/12 = 0.004167 = 0.4167%

   Now we have C = 1,000 and r = 0.4167%,

   $V_0 = \$1000/0.004167 = \$240,000$

3. How much would you have to donate to your alma mater so that a scholarship of $2000 that grows at an annual rate of 2% can be created in your name one year from today if

your endowment can be invested at an annual rate of 4%? Round off your answer to the nearest dollar.

Answer:

The correct answer is **100,000**.

In this problem you are asked to calculate the present value (PV) of a growing perpetuity.

Recall that $V_0 = C/(r-g)$

where V_0 is the present value of the cash flows, C is the first payment, g is the constant growth rate and r is the interest rate per period.

$V_0 = 2{,}000/(0.04-0.02) = 100{,}000$

4. Which one would you prefer if your opportunity cost of capital is 6 percent per year?

    a) Receiving $150,000 today

In order to compare these alternatives, we need to find the present value of each cash flow.

$V_0 = \$150{,}000$

    b) Receiving $100,000 today and a stream of cash flows every month for the next 36 months starting next month with $1250 every month and growing by 0.125% every month

In order to compare these alternatives, we need to find the present value of each cash flow stream. This is a growing annuity.

$V_0 = C \times ADF(r, n, g)$

where C is the first annuity payment r is the per period interest rate, n is the number of payments, and g is the constant growth rate.

$ADF(r,n,g) = (1 - (1+g)^n/(1+r)^n)/(r-g)$

$ADF(r = 6\%/12=0.5\%, n = 36, g = 0.125\%) = 33.5778$

$V_0 = C \times ADF(r, n, g) = 1250 \times 33.5778 = 41972.23$

Total value today = 100,000 + 41972.23 = 141,972.23

c) Receiving $750 every month forever starting today

In order to compare these alternatives, we need to find the present value of each cash flow stream. This is a perpetuity that starts immediately.

$V_0 = C/r$

C = 750, r = 6%/12 = 0.5%

Note that however this formula assumes that the first cash flow starts one period from today so we need to add on the first payment today.

$V_0 = 750/0.005 = 150,000$

Total value today = 150,000 + 750 = 150,750

d) Receiving $25000 today and a stream of cash flows every month forever starting with $500 next month growing by 0.125%

In order to compare these alternatives, we need to find the present value of each cash flow stream. This is a growing perpetuity that starts immediately.

The present value of the growing perpetuity is given by:

$V_0 = C/(r-g)$

where C = 500 , r = 6%/12 = 0.5% and g = 0.125%

$V_0 = 500/(0.5\%-0.125\%) = 133,333.333$

Total value = 133,333 + 25,000 = 158,333.333

Answer:

The correct answer is **d**.