

BUSINESS FINANCE (ACC501)

ASSIGNMENT NO.1 FALL 2024

Solution:

Given Data

Current tuition fee: \$12,000

Annual increase in tuition fee: 8%

Time (n): 10 years

Current savings: \$13,000

Part (a): What would the tuition fee of the state college be after 10 years?

Now we will use the future value (FV) formula to calculate the tuition fee:

$$FV = PV \times (1+r)^n$$

Where:

$$PV = 12,000 \text{ (current tuition fee)}$$

$$r = 8\% = 0.08 \text{ (annual increase rate)}$$

$$n = 10 \text{ (years)}$$

Substituting values:

$$FV = 12,000 \times (1+0.08)^{10}$$

$$FV = 12,000 \times (1.08)^{10}$$

First, calculate $(1.08)^{10}$

$$(1.08)^{10} = 2.1589$$

Now calculate FV:

$$FV = 12,000 \times 2.1589$$

$$FV = 25,906.8$$

Answer:

The tuition fee after 10 years will be \$25,906.80

Part (b): At what interest rate should Mr. Abid invest his savings (\$13,000) so that the future value of his investment equates with the future value of tuition fees?

Now we will use the future value formula again:

$$FV = PV \times (1+r)^n$$

Here:

$$FV = 25,906.8$$

(future tuition fee)

$$PV = 13,000$$

(current savings)

$$n = 10$$

(years)

$$r = ?$$

Rearranging for r:

$$1+r = \left(\frac{FV}{PV}\right)^{\frac{1}{n}}$$

$$r = \left(\frac{FV}{PV}\right)^{\frac{1}{n}} - 1$$

Substitute values:

$$r = \left(\frac{25,906.8}{13,000}\right)^{\frac{1}{10}} - 1$$

$$r = (1.9928)^{\frac{1}{10}} - 1$$

First, calculate $(1.9928)^{\frac{1}{10}}$:

$$(1.9928)^{\frac{1}{10}} = 1.0718$$

Now calculate r:

$$r = 1.0718 - 1$$

$$r = 0.0718$$

Convert to percentage:

$$r = 7.18\%$$

Answer:

The interest rate required is 7.18% per year.

Part (c): How long will it take for the future value of his savings (\$13,000) to equate with the future value of tuition fees if invested at an interest rate of 8%?

We use the future value formula again:

$$FV = PV \times (1+r)^n$$

Rearranging for n:

$$n = \frac{\log\left(\frac{FV}{PV}\right)}{\log(1+r)}$$

Here:

$$FV = 25,906.8 \quad FV = 25,906.8 \text{ (future tuition fee)}$$

$$PV = 13,000 \quad PV = 13,000 \text{ (current savings)}$$

$$r = 8\% = 0.08 \quad r = 8\% = 0.08$$

Substitute values:

$$n = \frac{\log\left(\frac{25,906.8}{13,000}\right)}{\log(1+0.08)}$$
$$n = \frac{\log(1.9928)}{\log(1.08)}$$

First, calculate $\log(1.9928)$:

$$\log(1.9928) = 0.3006$$

Next, calculate $\log(1.08)$:

$$\log(1.08) = 0.03342$$

Now calculate n:

$$n = \frac{0.3006}{0.03342}$$
$$n = 8.99$$

Answer:

So, it will take approximately 9 years for the savings to equate with the future value of tuition fees.

These are the final answers:

- a) Tuition fee after 10 years: \$25,906.80
- b) Required interest rate: 7.18% per year
- c) Time required at 8% interest rate: 9 years

THANK YOU

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