Summary Notes E8: Economic equivalence: Find N or i and Rule of 72

Other **possible questions** on economic equivalence including finding N and i, and making a rough estimate of growth of an asset using the "Rule of 72". These questions require a calculator. You can find a suitable calculator online if you do not have a hand held calculator. There is a calculator linked to on D2L under the module "Calculators."

1. **Find i** when F, P and N are given:

The **single-payment compound amount factor** was introduced in Summary Notes E7:

$F = P(1 + i)^N$ Expressed in functional notation as: F = P(F/P, i, N) (Say, "Find F, given P, i, and N")

Rearrange to find an expression for i:

$\frac{F}{P} = (1 + i)^N$

$(F/P)^{1/N} = 1 + i$

$i = (F/P)^{1/N} - 1$

Example: Suppose Rachel invested $1,000 for 5 years and her investment doubled during that time period. What is the compound annual rate of return on her investment (i)?

You are **given** P = $1,000, F = $2,000 and N = 5, and you need to find i.

$i = (\$2,000/\$1,000)^{1/5} - 1$

$i = 2^{1/5} - 1$

$i = 1.1487 - 1 = 0.1487$ or **14.87%**

2. **Find N** when F, P and i are given:

Rearrange $F = P(1 + i)^N$ to find an expression for N:

$(F/P) = (1 + i)^N$

$\log(F/P) = N(\log(1 + i))$

$N = \frac{\log(F/P)}{\log(1 + i)}$

Example: Suppose Rachel invested $1,000 at 10% interest, how long will it take for her investment to double?

You are *given* P = $1,000, F = $2,000 and i = 10%, and you need to find N

$N = \frac{\log(2)}{\log(1.1)} = \frac{0.30103}{0.04139} =$ **7.27 years**

3. Make a rough estimate using the "**Rule of 72**"

To find how long it will take for a sum of money to double, divide 72 by the interest rate (i)

Example: At a 10% interest rate, how long will it take a sum of money to double?

Answer: 72/10 = **7.2 years**

This is very close to the 7.27 years we found in the answer above.

FE exam questions may say "*about how long*" to hint that you can probably get by with the rule of 72.