4. Growth accounting

**4.1** Consider an economy whose production function is given by: Y = A.K0.7.L0.3. If, in 2022, this economy’s GDP (Y) grew by 1.2%, the physical capital stock (K) grew by 0.8% and the labour force (L) grew by 0.5%, calculate by how much Total Factor Productivity (A) grew in 2022.

**4.2** Consider an economy whose production function is as follows: Y = A.K0.6.(h.L)0.4 , and whose GDP in 2022 amounted to 50 Billion monetary units. Assuming that, in the period 2022-2042, the average annual growth rates of TFP (A), the physical capital stock (K), the average stock of human capital per worker (h) and the labour force (L) will respectively be 2%, 1.5%, 1% and 0.5%, calculate the level of GDP of this economy in 2042.

**4.3** Suppose that output, Y, in an economy is produced by combining physical capital, K, with skilled labour, h.L, according to a constant-returns *Cobb-Douglas* production function with disembodied technical progress:

Y(t) = A(t).K(t)0.4.[h(t).L(t)] 0.6

where K is the stock of physical capital, L is the labour force and h is the average human capital per worker. In the last 20 years the labour force grew at an annual rate of 0.6%, the average human capital per worker grew at an annual rate of 1% and the stock of physical capital grew at an annual rate of 2.5%. Assume that the annual growth rate of GDP was 3% in the last 20 years. Calculate the average annual growth rate of the total factor productivity, r(A), in this period.

**4.4** Suppose an economy with a Cobb-Douglas aggregate production function with disembodied technical progress, with elasticities of output relative to physical capital equal to 0.3 and to the human capital equal to 0.7. Calculate the average annual growth rate of the labour productivity, assuming that the total factor productivity (TFP) has grown at an annual average rate of 1%, the average human capital per worker has grown at an annual average rate of 0.5% and the stock of physical capital per worker has grown at an annual average rate of 2%.