Épreuve de section européenne

The Keynesian Multiplier

The English economist Lord Keynes (1883 – 1946) proved the efficiency of public investments by using the math concept of geometric sequences and the sum of their terms. He showed that 1 pound invested by the government (for instance to build a new road) has an effect on the national economy which is greater than 1, thanks to a sort of chain reaction. So the "Keynesian multiplier" works as follows :

The principle of this chain reaction comes from the concept of marginal propensity to consume (MPC). The MPC is the money people spend when they get an extra pound of income. For example, if the MPC is equal to 0.8, when people get an extra pound of income, they spend 80 cents of it.

Now, we know that when the government increases its expenditure by 1 pound on a good produced by agent A, this pound becomes A's income. As the MPC is 0.8, A will spend 80 cents of this extra income on something he wants to consume. Suppose A spends the 80 cents on a good produced by B, then B would have an extra income of 80 cents. B would then spend 80% of these 80 cents, ie, 64 cents, on something else. This 64-cent sum becomes someone else's income, who will spend 0.8 of it. The process repeats itself. The Gross Domestic Product (GDP) added to the economy is the sum of all these spendings, 1 + 0.8 + 0.64 + 0.512 + ... which has a larger effect than the 1 pound that the government originally spent. This sum is called the Keynesian multiplier. In other words, the government spending is "multiplied".

Adapted from *Wikipedia* and various sources

Questions

1. Explain the process leading to the "Keynesian multiplier" in your own terms, using the example of building a new road.
2. Mathematically, 1 + 0.8 + 0.64 + ... is the infinite sum of a geometric sequence.
   a. Explain why $1+0.8+0.8^2+.....+0.8^n=\frac{1-0.8^{n+1}}{1-0.8}$.
   b. What is the limit of $1+0.8+0.8^2+.....+0.8^n$ when n tends to infinite?
   c. Find the Keynesian multiplier if the MPC is 0.8.
3. Prove that the Keynesian multiplier is more generally $\frac{1}{1-\text{MPC}}$.
4. Should a government stimulate consumption?