1. Introduction

The population of Turkey is around 82 million people. The population growth rate is around 1.3% in Turkey. When will the population be 100 million people? To answer this question, let us start with a simpler question.

Q: You have 1 mil. TL in the bank. The bank pays x as the interest rate (per annum). How much money would you have next year? The answer is

Q: What about after years?

Q: Why are we answering these questions?

A: When we are done, it will turn out that and are very natural components of the nature of growth. What we need to see eventually is that neither nor are mathematical contrivances.

 Q: Suppose that you follow the following strategy. Every six months, you go to the bank, withdraw your money, and put it back for extra interest income. What would be your income in a year? (Interest rate is still )

A:

Q: What if you follow this strategy not for every six months but for every day?

A:

Suppose that the interest rate is 10%. Then the answer above would be

However, it is also true that

Indeed,

is true for any , assuming is large.

Q: Let us remember our original question. When will the population of Turkey be 100 million?

A: Today, it is 82 million. Growth rate is 1.13%. So after years the population will be

After years, the answer is

So the answer should satisfy this equation

Take the logarithm to see

1. Rules of logarithms and exponentials:
2. If then . (Natural logarithm is the inverse of exponential function).