

Lecture 26

Wednesday, February 26, 2025 9:50 AM

Worksheet: practice on the logistic model

In reality, we don't know the carrying capacity M . You can find it using data of the past.

Example: two decades ago, the population of the Philippines is 50 million. Last decade, it was 80 million. This year, it is 100 million. What is your prediction of the population next decade. You can model the problem as follows.

Let $y(t)$ be the population at time t (counting from two decades ago).

$$y' = ry \left(1 - \frac{y}{M}\right)$$

$y(0) = 50, y(10) = 80, y(20) = 100$. What is $y(30)$?

We know that

$$y = \frac{M}{1 + ce^{-rt}}$$

There are 3 unknown constants in this formula, namely M, r, c . You will use the 3 conditions $y(0) = 50, y(10) = 80, y(20) = 100$ to find them. Once you have found them, you can compute $y(30)$.