Math 302

Chapter 1

Section 1.1: Applications Leading to DEs

Contents

Created by: Pierre-Olivier Parisé
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Newton's Law of Cooling

Example 1. Let $T = T(t)$ be the temperature of a body at time t and let T_m be the temperature of its surrounding. Assuming that

- the rate of cooling of the body is directly proportial to the temperature difference of the surface area exposed
- the temperature of the surrounding does not change

deduce a model describing the evolution of the temperature $T(t)$ of the body.

Little experiment

Example 2. Poor some hot water in a teapod and take its temperature with a thermometer. Take the temperature every 5 minutes. Record your data in a table and plot them in a Times VS Temperature graph.

Tables

Time	Temperature

Time	Temperature

Plots

Second Version of Newton's Law of Cooling

Assuming that the medium (surrounding) remains at constant temperature seems reasonable if we're considering a cup of tea/coffee cooling in a room.

What if the body warms or cools its surrounding, resulting in changing drastically the surrounding temperature?

Example 3. Let $T = T(t)$ be the temperature of the body at time t and let T_m be the temperature of its surrounding. Assuming that

- the rate of cooling of the body is directly proportial to the temperature difference of the surface area exposed

deduce a model describing the evolution of the temperature $T(t)$ of the body.