Math 302

Chapter 1

Section 1.1: Applications Leading to DEs

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Little experiment

Example 1. 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

Newton's Law of Cooling

Example 2. 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.

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 $T_m = T_m(t)$ 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 energy is preserved

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