Math 2552 – Differential Equations

Welcome!

Lectures: Mon & Wed, 12:35-1:55 pm, Yellow Room

Recitations: Tue & Thu, 2:30-3:30 pm, Yellow Room

Please note: Lecture on Fri, Aug 23, 9:30-11:00, Pink Room

Instructor	Email	Office Hours & Location
Angela Pasquale	angela.pasquale@univ.lorraine.fr angela.pasquale@georgiatech-metz.fr	Mon & Wed, 2-3 PM, or by appointment. Office: IL 005

Teaching Assistant	Email	Office Hours & Location
Sofiane Karrakchou	sofiane.karrakchou@gatech.edu	Please see with the TA

Course Description

Math 2552 is an introduction to differential equations, with a focus on methods for solving some elementary differential equations and on real-life applications.

Practical Information

There will be five quizzes (15-20 minutes), two midterms (50 minutes), and a comprehensive final exam (2 hours 50 minutes).

Homework: exercises from the textbook. It will not be collected nor graded.

Course Text: *Differential Equations: An Introduction to Modern Methods & Applications*, by James R. Brannan and William E. Boyce (3rd edition), John Wiley and Sons, Inc.

Course Website:

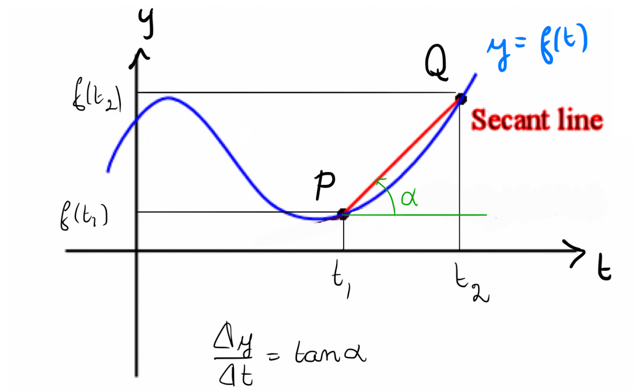
http://www.iecl.univ-lorraine.fr/~Angela.Pasquale/courses/2019/Math2552/Fall19.html

The rate of change of a differentiable function $y = f(t)$

The **average rate of change** of y with respect to t over the interval $[t_1, t_2]$ is

$$\frac{\Delta y}{\Delta t} = \frac{f(t_2) - f(t_1)}{t_2 - t_1}$$

It is the slope of the secant line to the graph of f thorugh P and Q.



average rate of change = slope of the secant line

By taking the average rate of change over smaller and smaller intervals (i.e. by letting $t_2 \to t_1$) the secant line becomes the tangent line.
We obtain the **(instantaneous) rate of change of** y **with respect to** t **at** t_1 :

$$\frac{dy}{dt} = \lim_{\Delta t \to 0} \frac{\Delta y}{\Delta t} = \lim_{t_2 \to t_1} \frac{f(t_2) - f(t_1)}{t_2 - t_1} = f'(t_1)$$

It is the slope of the secant line to the graph of f at P.

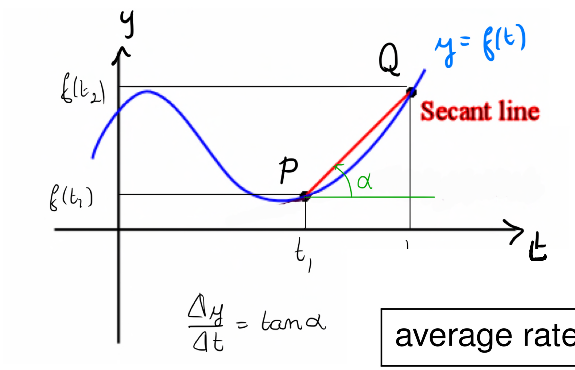
rate of change at t_1 = slope of the tangent at $P = f'(t_1)$

The rate of change of a differentiable function $y = f(t)$

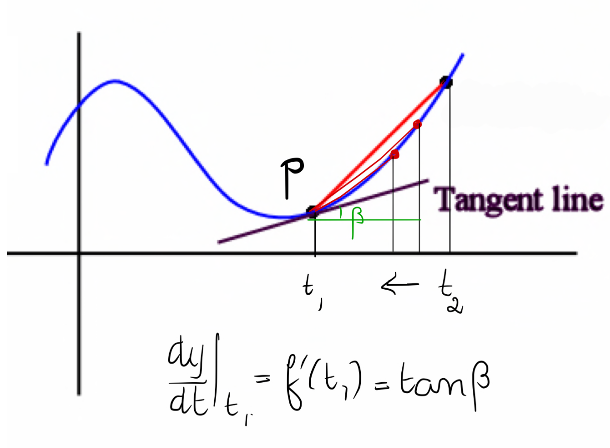
The **average rate of change** of y with respect to t over the interval $[t_1, t_2]$ is

$$\frac{\Delta y}{\Delta t} = \frac{f(t_2) - f(t_1)}{t_2 - t_1}$$

It is the slope of the secant line to the graph of f thorugh P and Q.



average rate of change = slope of the secant line



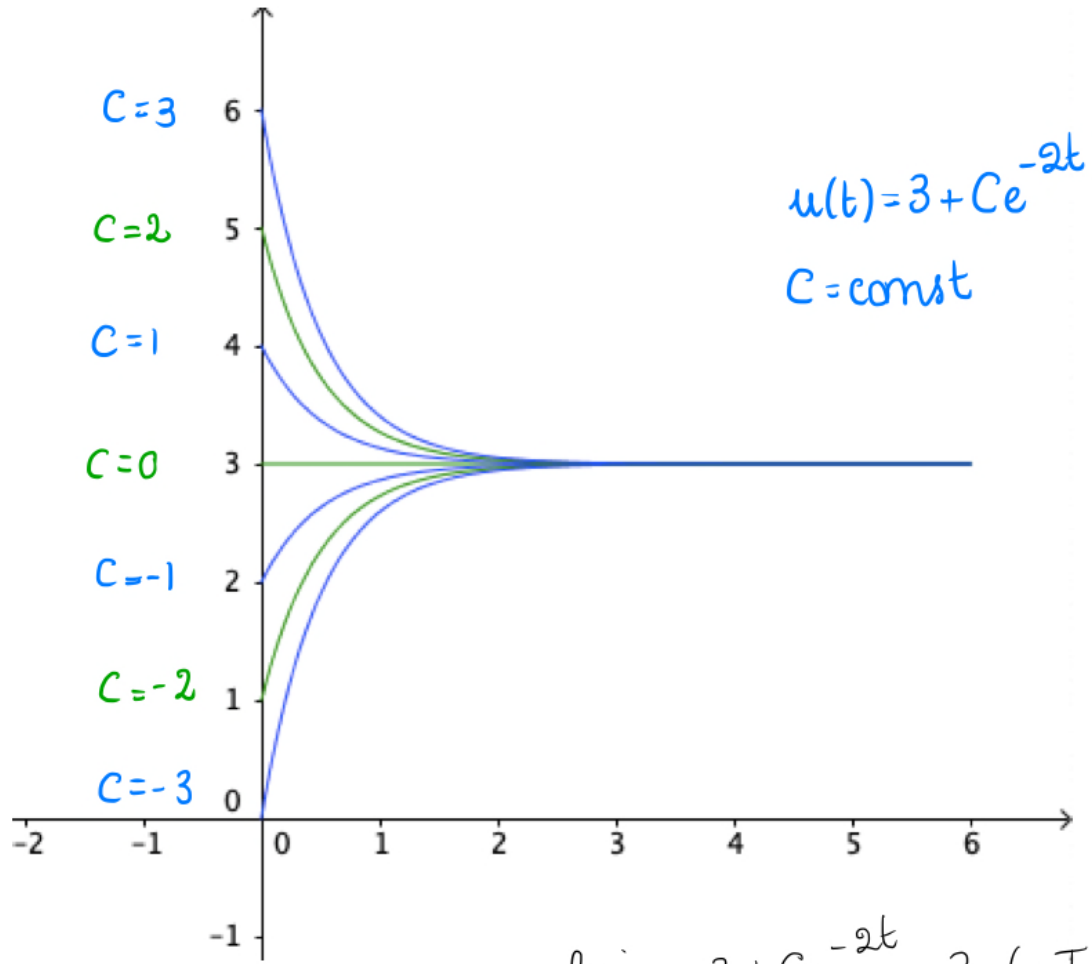
By taking the average rate of change over smaller and smaller intervals (i.e. by letting $t_2 \to t_1$) the secant line becomes the tangent line.
We obtain the **(instantaneous) rate of change of y with respect to t at t_1** :

$$\frac{dy}{dt} = \lim_{\Delta t \to 0} \frac{\Delta y}{\Delta t} = \lim_{t_2 \to t_1} \frac{f(t_2) - f(t_1)}{t_2 - t_1} = f'(t_1)$$

It is the slope of the secant line to the graph of f at P.

rate of change at t_1 = slope of the tangent at P=$f'(t_1)$

$$\frac{du}{dt} = -2(u-3) \qquad k=2,\ T_0=3$$



$$u(t) = 3 + Ce^{-2t}$$

$C = \text{const}$

$$\lim_{t \to +\infty} 3 + Ce^{-2t} = 3 \quad (= T_0)$$

$$C = u(0) - 3 = u(0) - T$$