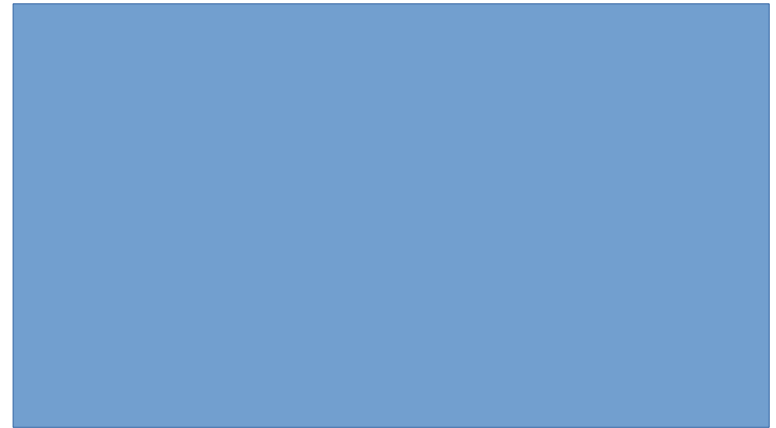


# **Cálculo Numérico – LEQB**



# Conteúdos programáticos:

**1- Introdução. Importância do Cálculo Numérico na Engenharia.**

**2- Introdução ao Python.**

**3- Introdução à teoria dos erros. Majorantes de erro. Fórmula fundamental do cálculo dos erros. Referência à análise intervalar.**

**4- Método dos mínimos quadrados. Casos discreto e contínuo.**

**5- Interpolação polinomial. Polinómio interpolador de Lagrange. Erro na interpolação. Interpolação inversa.**

**4- Integração Numérica. Fórmulas de Newton-Cotes fechadas (fórmulas simples e compostas).**

**5- Resolução numérica de equações não lineares. Método da bisection and método de Newton-Raphson.**

**6- Integração numérica de equações diferenciais ordinárias. Equações diferenciais ordinárias de 1ª ordem (Método de Euler; Método de Heun; Método de Runge-Kutta). Sistemas de equações diferenciais ordinárias de 1ª ordem (Método de Runge-Kutta).**

- **Bibliografia principal**

**Santos, F. C., "Fundamentos de Análise Numérica", Edições Sílabo, 2002.**

**Gilat, A., Subramaniam, V., "Métodos Numéricos para Engenheiros e Cientistas", 2008.**

**Burden, R. L., Faires, J. D., "Numerical Analysis", Books/Cole, 1997.**

**Chapra, S.C., Canale, R.P. "Numerical Methods for Engineers", McGraw-Hill, 2006.**

**Kharab, A. Guenther, R. B., "An introduction to numerical methods: A Matlab Approach", Chapman & Hall /CRC, 2002.**

- **Avaliação**

Avaliação de conhecimentos: duas componentes alternativas - avaliação contínua ou avaliação por exame.

Avaliação contínua:

Um teste global (TG) (80% da classificação final)

Trabalho prático computacional (TP) (20% da classificação final)

$NF = 0,8 TG + 0,2 TP;$

$NF \geq 10$

Avaliação por exame:

Exame Final (EF). Aprovação com a classificação mínima de 10 valores.

$NF = EF \geq 10$

# Regime de Avaliação Contínua:

1. Um teste global cuja classificação corresponde a 80% da classificação final.
2. Trabalho prático computacional, cuja classificação corresponde a 20% da classificação final.

Aprovação com classificação mínima de 10 valores e pelo menos 8 valores no Teste Global.


Regime de Exame:


Prova escrita.

Aprovação com a classificação mínima de 10 valores.

- Repositório com transparecias e código:

<https://github.com/CalculoNumerico1920SVLeandro>

[Why GitHub?](#) [Enterprise](#) [Explore](#) [Marketplace](#) [Pricing](#)  [Sign in](#) [Sign up](#)



[Overview](#) [Repositories 2](#) [Projects 0](#) [Stars 0](#) [Followers 0](#) [Following 0](#)

### Popular repositories


[CN-1920SV-regras-bibliografia](#)  
Regras e Bibliografia da UC

[CN-1920SV-notebook](#)  
Ficheiros com as aulas e código Python


### 8 contributions in the last year

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Mon												
Wed												
Fri												

[Learn how we count contributions.](#)

Less  More


CalculoNumerico1920SVLeandro


 Joined 7 hours ago

[Block or report user](#)

- Repositório com transparecias e código:

<https://github.com/CalculoNumerico1920SVLeandro/CN-1920SV-regras-bibliografia>

 Why GitHub? ▾ Enterprise Explore ▾ Marketplace Pricing ▾

Search 

Sign in Sign up

CalculoNumerico1920SVLeandro / CN-1920SV-regras-bibliografia






Watch 1 Star 0 Fork 0

[Code](#) [Issues 0](#) [Pull requests 0](#) [Actions](#) [Projects 0](#) [Security](#) [Insights](#)

Regras e Bibliografia da UC

5 commits 1 branch 0 packages 0 releases 1 contributor

Branch: master ▾ New pull request Find file Clone or download ▾

 CalculoNumerico1920SVLeandro Programa - Avaliacao - bibliografia	Latest commit a6a621f 4 hours ago
 <a href="#">ExemploAvaliacao</a>	Please enter the commit message for your changes. Lines starting 5 hours ago
 <a href="#">ExemplosProjetos</a>	Exemplo de Projetos 5 hours ago
 <a href="#">Avaliacao_CN.pdf</a>	Regime de avaliacao continua 5 hours ago
 <a href="#">ProgramaAvaliaBiblio.pdf</a>	Programa - Avaliacao - bibliografia 4 hours ago

- Repositório com transparecias e código:

<https://github.com/CalculoNumerico1920SVLeandro/CN-1920SV-notebook>




Why GitHub? ▾ Enterprise Explore ▾ Marketplace Pricing ▾


Search



Sign in

Sign up

 [CalculoNumerico1920SVLeandro](#) / [CN-1920SV-notebook](#)

 Watch


0


 Star

0

 Fork


0

 Code


 Issues 0

 Pull requests 0

 Actions


 Projects 0


 Security

 Insights

Ficheiros com as aulas e código Python

 1 commit

 1 branch

 0 packages

 0 releases

 1 contributor

Branch: master ▾

New pull request

Find file

Clone or download ▾



CalculoNumerico1920SVLeandro Semana 1

Latest commit 096876a 2 minutes ago



00\_apresentacao.ipynb

Semana 1

2 minutes ago



00\_intro\_Calculo\_Numerico.ipynb





Semana 1




2 minutes ago














- Repositório com transparecias e código:


[https://github.com/CalculoNumerico1920SVLeandro/CN-1920SV-notebook/blob/master/00\\_apresentacao.ipynb](https://github.com/CalculoNumerico1920SVLeandro/CN-1920SV-notebook/blob/master/00_apresentacao.ipynb)

 Search or jump to...  Pull requests Issues Marketplace Explore  








CalculoNumerico1920SVLeandro / CN-1920SV-notebook  Watch 0  Star 0  Fork 0

 Code  Issues 0  Pull requests 0  Actions  Projects 0  Wiki  Security  Insights

Branch: master  CN-1920SV-notebook / 00\_apresentacao.ipynb  Find file  Copy path

 CalculoNumerico1920SVLeandro Semana 1 096876a 42 minutes ago

1 contributor

49 lines (49 sloc) | 798 Bytes   Raw  Blame  History   

In [1]: 

```
print("Test")
```

```
Test
```

In [ ]:

- Recursos computacionais: <https://colab.research.google.com/>

Obs: Para usar o <https://colab.research.google.com/> têm de ter uma conta na google

The screenshot displays the Google Colaboratory (Colab) web interface. At the top, the 'Welcome To Colaboratory' header is visible, along with a navigation menu (File, Edit, View, Insert, Runtime, Tools, Help) and a 'Sign in' button. On the left, a 'Table of contents' sidebar lists sections like 'Getting started', 'Data science', 'Machine learning', and 'More Resources'. The main content area features a large introductory card titled 'What is Colaboratory?'. This card explains that Colab allows users to write and execute Python in their browser, highlighting three key features: zero configuration required, free access to GPUs, and easy sharing. It also encourages users to watch an 'Introduction to Colab' video or get started directly. Below the introductory card, the 'Getting started' section is partially visible, indicating that the document is an interactive 'Colab notebook'.

CO Welcome To Colaboratory

File Edit View Insert Runtime Tools Help

Share Settings Sign in

Table of contents

- Getting started
- Data science
- Machine learning
- More Resources
- Machine Learning Examples
- Section

+ Code + Text Copy to Drive

Connect Editing

## CO What is Colaboratory?

Colaboratory, or "Colab" for short, allows you to write and execute Python in your browser, with

- Zero configuration required
- Free access to GPUs
- Easy sharing

Whether you're a **student**, a **data scientist** or an **AI researcher**, Colab can make your work easier. Watch [Introduction to Colab](#) to learn more, or just get started below!

### Getting started

The document you are reading is not a static web page, but an interactive environment called a **Colab notebook** that

- Recursos computacionais: <https://colab.research.google.com/>

The screenshot displays the Google Colaboratory web interface. On the left, a sidebar contains a 'Table of contents' with links to 'Introducing Colaboratory', 'Getting Started', 'More Resources', 'Machine Learning Examples: Se...', and a 'Section' icon. The main area features a top navigation bar with tabs: 'Examples', 'Recent' (selected), 'Google Drive', 'GitHub', and 'Upload'. Below the tabs is a search bar labeled 'Filter notebooks' with a dropdown arrow. A table with columns 'Title', 'First opened', and 'Last opened' is shown, but it contains no data rows. A message 'No results' is centered below the table. At the bottom right, there are two buttons: 'NEW NOTEBOOK' and 'CANCEL'. The background shows parts of the Colab interface, including a 'Share' button and a 'Connect' dropdown.

Welcome To Colaboratory

File Edit View Insert Run Help

Examples Recent Google Drive GitHub Upload

Filter notebooks

Title	First opened	Last opened
No results		

NEW NOTEBOOK CANCEL

- Recursos computacionais: <https://colab.research.google.com/>

The screenshot shows the Google Colaboratory interface. On the left, a sidebar contains a 'Table of contents' with links to 'Introducing Colaboratory', 'Getting Started', 'More Resources', and 'Machine Learning Examples: Se'. The main area displays a modal for connecting to a GitHub repository. The modal has a top bar with tabs: 'Examples', 'Recent', 'Google Drive', 'GitHub' (selected), and 'Upload'. Below the tabs, there is a search bar with the text 'Enter a GitHub URL or search by organization or user' and a checkbox for 'Include private repos'. A search bar contains the URL '://github.com/CalculoNumerico1920SVLeandro/CN-1920SV-notebook/blob/master/00\_apresentacao.ipynb'. Below this, there are dropdown menus for 'Repository' (showing 'CalculoNumerico1920SVLeandro/CN-1920SV-notebook') and 'Branch' (showing 'master'). A 'Path' section lists two files: '00\_apresentacao.ipynb' and '00\_intro\_Calculo\_Numerico.ipynb', each with a search icon and a link icon. At the bottom right of the modal are the buttons 'NEW NOTEBOOK' and 'CANCEL'.

Welcome To Colaboratory

File Edit View Insert Run Help

Examples Recent Google Drive **GitHub** Upload

Enter a GitHub URL or search by organization or user ☐ Include private repos

[://github.com/CalculoNumerico1920SVLeandro/CN-1920SV-notebook/blob/master/00\\_apresentacao.ipynb](://github.com/CalculoNumerico1920SVLeandro/CN-1920SV-notebook/blob/master/00_apresentacao.ipynb) 🔍

Repository: [🔗](#) Branch: [🔗](#)

CalculoNumerico1920SVLeandro/CN-1920SV-notebook master

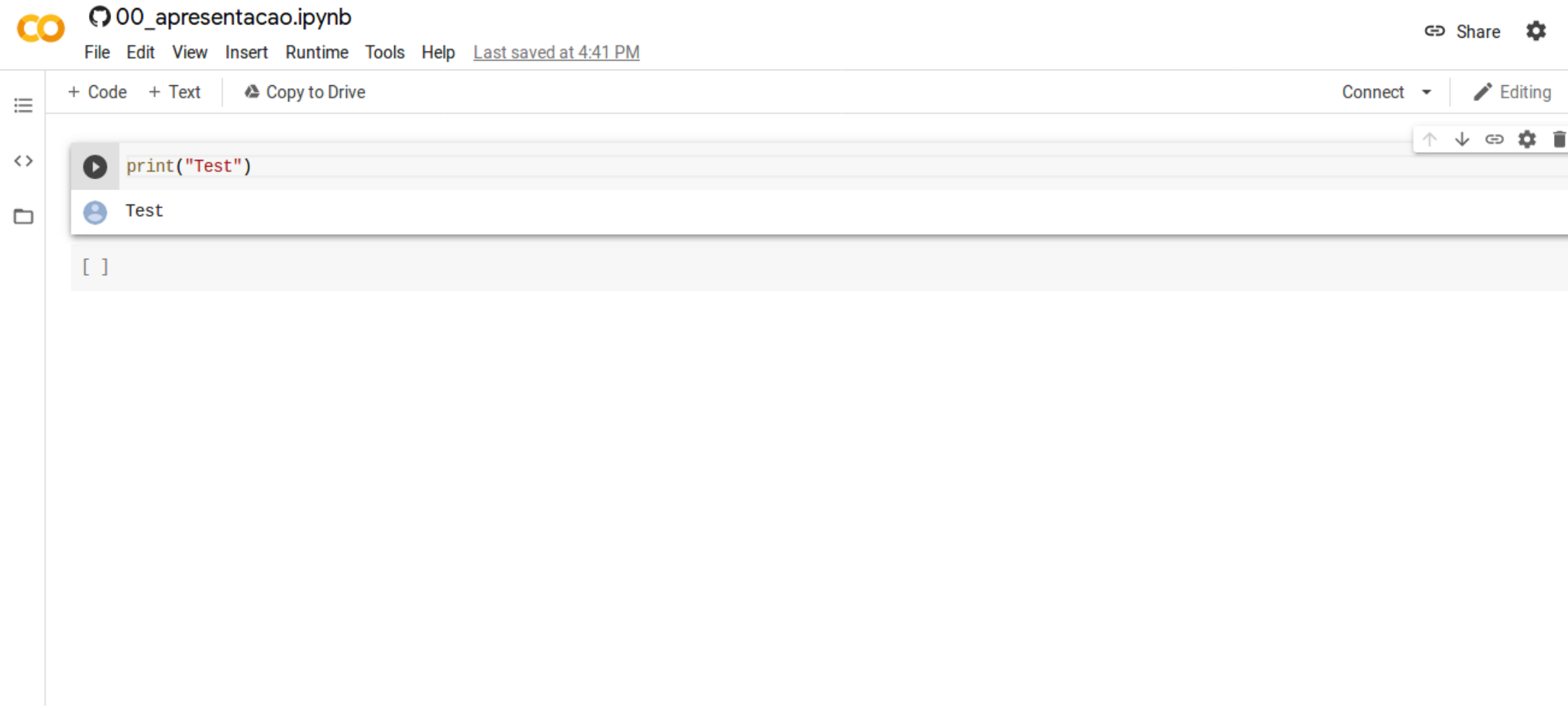
Path

00\_apresentacao.ipynb 🔍 📄

00\_intro\_Calculo\_Numerico.ipynb 🔍 📄

[NEW NOTEBOOK](#) [CANCEL](#)

- Recursos computacionais: <https://colab.research.google.com/>



The screenshot displays the Google Colab web interface. At the top left is the Colab logo. The notebook title is '00\_apresentacao.ipynb'. A menu bar includes 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', and 'Help', followed by a status message 'Last saved at 4:41 PM'. On the top right, there are 'Share' and 'Settings' icons. Below the menu bar, a toolbar shows '+ Code', '+ Text', and 'Copy to Drive'. On the far right of this toolbar are 'Connect', 'Editing', and a trash icon. The main workspace contains a single code cell with the text `print("Test")`. Below the code cell, the output is displayed as 'Test'. On the left side of the interface, there is a vertical sidebar with icons for a menu, a code editor, and a file explorer.