

1. イントロダクション



東北大学 大学院工学研究科

嶋田 慶太



TOHOKU
UNIVERSITY



- 担当教員と授業概要
- 授業の目的
- 評価
- 日程
- Octave/MATLABについて
- GNU Octave のインストール



担当教員と授業概要

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授業の情報

Computer Vision Lab@Tohoku Univ.

– Courses

– Exercises in Computer-aided Problem Solving

<http://www.vision.is.tohoku.ac.jp/us/course/computer-aided-problem-solving/>

okatani tohoku



正規資料は英語, 副教材としてスライドを使う



- コンピュータを利用して数学的問題を解く方法について学習する
- GNU Octaveというソフトウェアを使用するが, ソフトウェアの利用法の習得ではなく, あくまでも数学的な技術を習得することが目的である.
- とはいえ, Octave(もしくはMATLAB)の基本的な利用法についてから進める.
- 本授業は微分方程式や線形代数等, 既習の内容のみならず, 数値解析, 信号処理, 統計学や機械学習の内容も含む.
- 授業の最終的な目的はOctaveの利用を通じて問題解決能力を身に着けることである.



Purpose of this course

音楽のオクターブではなく、



<http://cbee.oregonstate.edu/levenspiel-memoriam>

a computer can be used to solve r

use **Octave** for this

skills rather than learning how to

age of **Octave (or MATLAB)** and

I learn how they can solve vario

executing simple programs.



GNU Project
の一種

- The course will cover not only mathematics that students have already learned, such as **calculus, differential equation, linear algebra**, etc., but also those that they have not learned, such as **numerical computation, signal processing, statistics, machine learning**, etc.
- The goal of this course is to have students master skills of solving the specific problems considered in this course using Octave (or MATLAB) and further obtain a concept of how they can utilize a computer to deal with novel problems.

微積分, 微分方程式, 線形代数

数値計算, 信号処理, 統計, 機械学習



- 授業では毎回ノート型PCを使用する.
- 今回を除いて授業ごとに演習課題がある.
 - 授業前半: 解説, 後半: 課題に取り組む時間.
 - 授業時間内に課題が終了した場合 ▶ 課題提出 & 退室してもよい.
- 演習課題の締切は1週間.
 - クォーター授業のため月金で授業があるが, 月曜の課題は次の月曜に提出
 - 提出はEmailで直接 .m ファイル (+ α) を下記アドレスに送る.
 - shimada@m.tohoku.ac.jp
 - kino@lbc.mech.tohoku.ac.jp
- 成績は出席と課題に対しての重み付き合計で決定.

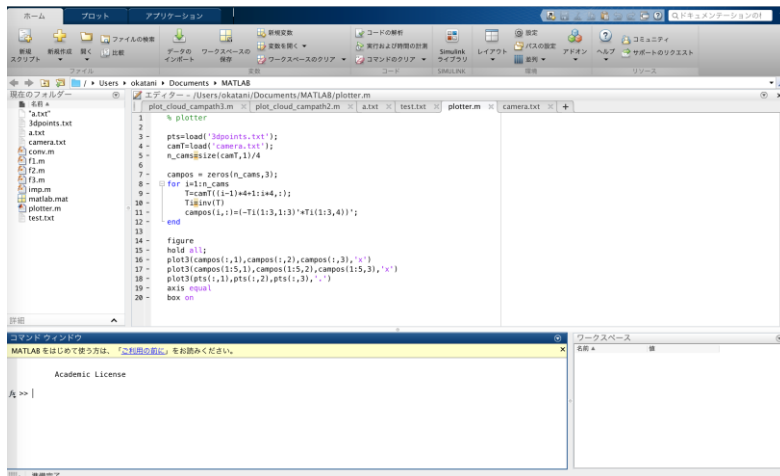


11 th Jun	1.Introduction and installation of Octave
15 th Jun	2.Fundamentals of Octave/MATLAB
18 th Jun	3.Matrices and linear algebra I
22 th Jun	4.Roots of algebraic and transcendental equations
25 th Jun	5.Least-square method and line fitting
29 th Jun	6.Numerical integration and ordinary differential equations
2 nd Jul	7.Signal processing
6 th Jul	8.Probability theory: basics
9 th Jul	9.Statistics I
13 th Jul	10.Matrices and linear algebra II
20 th Jul	11.Statistics II
23 rd Jul	12.Machine learning I
27 th Jul	13.Machine learning II
30 th Jul	14.(backup for schedule change)
3 th Aug	15.(backup for schedule change)



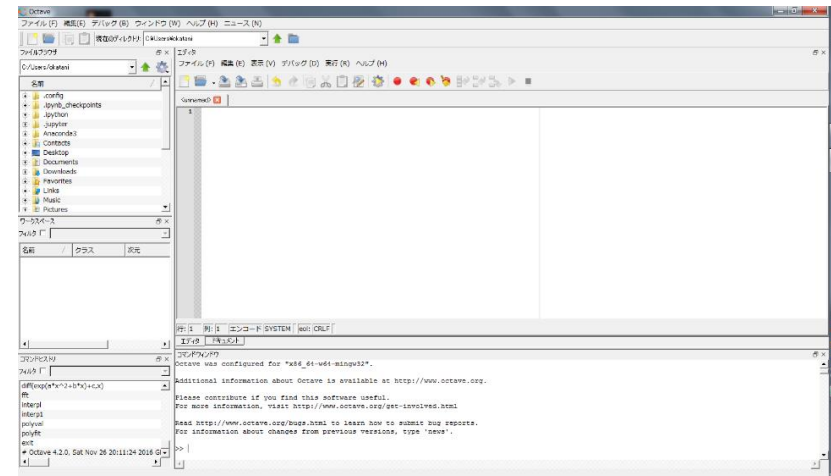
MATLAB

- A numerical computing environment and programming language developed and sold by MathWorks
- *De facto* standard in many scientific/engineering fields the world over
- A wide variety of extensions, called *toolboxes*, are available for use in a diverse field of applications



GNU Octave

- A numerical computing environment and programming language developed by volunteers and can be used for free
- Compatible to MATLAB to a certain degree
- A variety of extensions called *packages*, the counterpart of the toolboxes, is available but has only limited compatibility





Registration of a MAC address

Registration of a MAC address of your computer

The courses of Exercises in Computer-Aided Problem Solving, Computer Seminar, and Fortran Exercise

You first need to register a Media Access Control (MAC) address of your computer when you connect to the wired LAN in the classroom of Exercises in Computer-Aided Problem Solving, Computer Seminar, and Fortran Exercise.

Register your student ID number, name, MAC address, and lecture through the following URL.

<http://pc-mac.eng.tohoku.ac.jp/mech/>

Accessible only through the classroom wired LAN

持込みPC MAC(物理)アドレス登録

数理解題学演習、コンピュータ実習、フォートラン演習

Registration of a MAC address of your computer

The courses of Exercises in Computer-Aided Problem Solving, Computer Seminar, and Fortran Exercise

お名前と、授業履修予定で利用するPCのMACアドレス(物理)アドレスを登録して下さい。使用するPCが複数ある場合は、全て登録して下さい。
Register a MAC address of your computer. If you use multiple computers, register all the MAC addresses.

学籍番号 (学籍番号を入力)
(Student ID number: e.g. 12345678)

氏名 (Surname, first name)
姓: 名:

あなたの利用するPCのMACアドレス (e.g. 12:34:56:78:9A:BC)を20文字で入力して下さい。
MAC address of your computer: e.g. 12:34:56:78:9A:BC

履修する授業を選択してください。
Select a lecture

Attention

- The URL is open only during the registration period. If you have changed your MAC address, please report your new MAC address to the teacher.
- If you use multiple computers, register all the MAC addresses.

※ Follow the following processes if you do not know how to identify the MAC address of your computer

How to identify MAC address 1/3



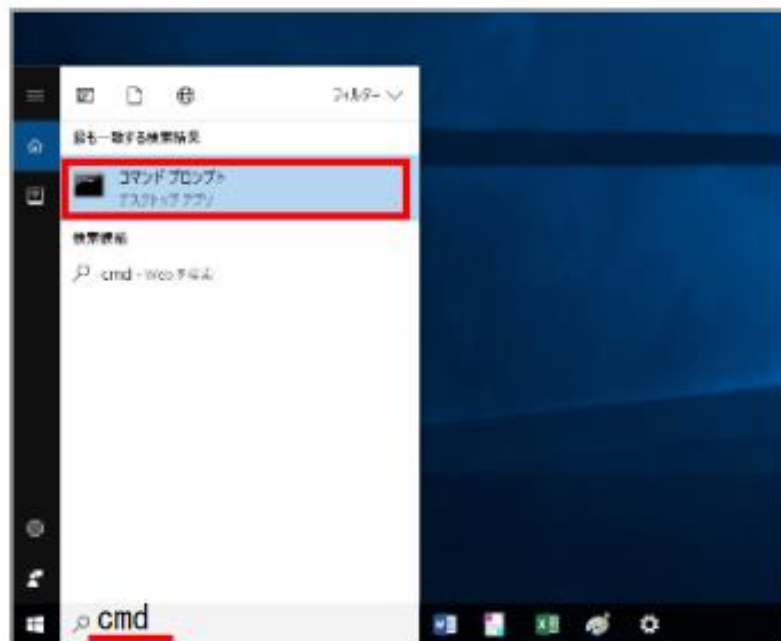
10

Examples of how to identify MAC address

1. Open cmd.exe (command prompt)

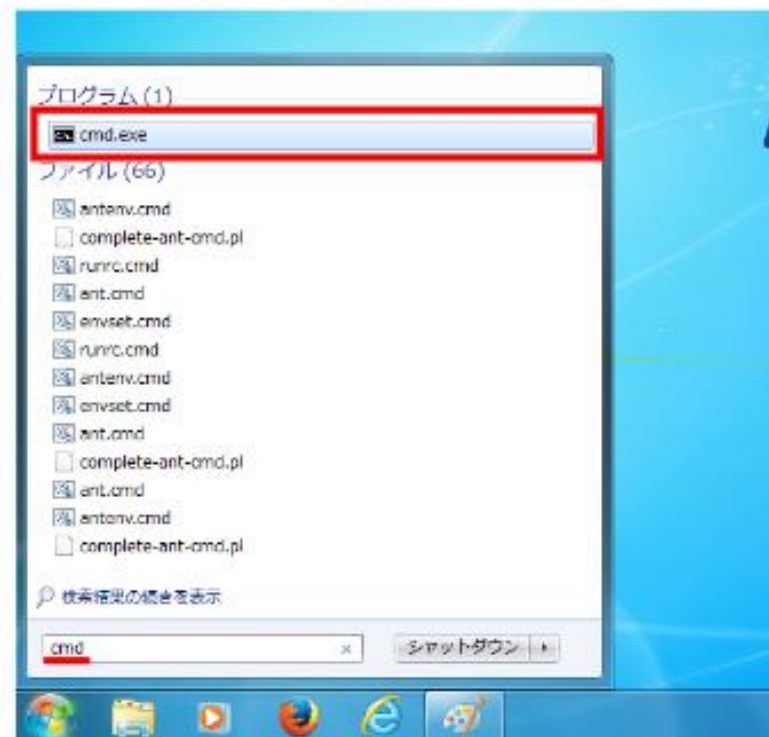
[Windows10]

Type "cmd" in the search box next to the start button  at the bottom-left corner.



[Windows7]

Click the start button  at the bottom-left corner, and type "cmd" in the search box.



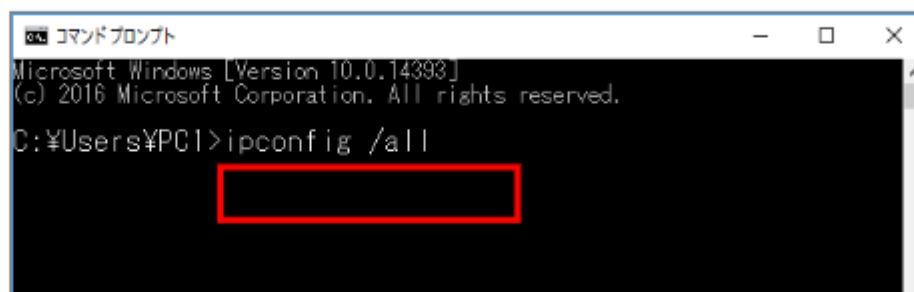
How to identify MAC address 2/3



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2. Click the command prompt [Windows10] or cmd.exe [Windows7]
3. Type the command "ipconfig /all" into the command prompt, and press Enter

ipconfig /all
↑
Space



```
コマンドプロンプト
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.
C:\Users\PC1>ipconfig /all
```

4. You will see the MAC address (Physical address) of all network adapters on your computer

Attention Multiple physical addresses will be shown if your computer has multiple network adapters, or wired/wireless adapters.

Find the following adapter name and Physical address

[Windows10] Ethernet adapter Ethernet

[Windows7] Ethernet adapter Local Area Connection

How to identify MAC address 3/3



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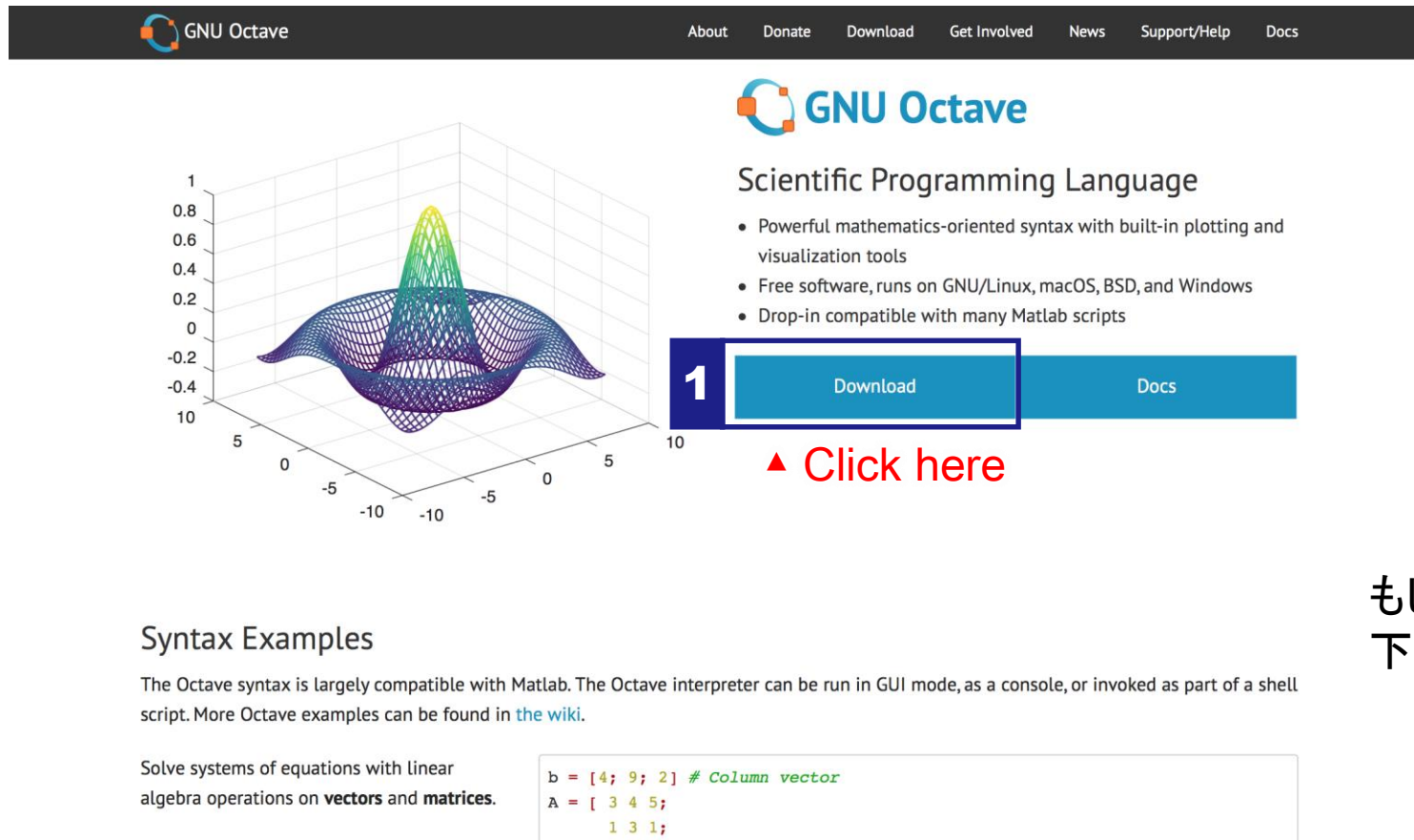
```
コマンドプロンプト
WINS プロキシ有効 . . . . . : いいえ
イーサネット アダプター イーサネット:
接続固有の DNS サフィックス . . . . :
説明 . . . . . : Intel(R) Ethernet Connection (4) I219-LM
物理アドレス . . . . . : XX-XX-XX-XX-XX-XX
DHCP 有効 . . . . . : はい
自動構成有効 . . . . . : はい
IPv4 アドレス . . . . . :
サブネット マスク . . . . . : 255.255.0.0
リース取得 . . . . . : 2017年3月6日 13:04:34
リースの有効期限 . . . . . : 2017年3月8日 9:23:18
デフォルト ゲートウェイ . . . . . :
DHCP サーバー . . . . . :
DNS サーバー . . . . . : 130.34.11.111
                             130.34.11.123
NetBIOS over TCP/IP . . . . . : 有効
Wireless LAN adapter ローカル エリア接続* 2:
```

MAC address is in the line of "Physical address" and shown as 「XX-XX-XX-XX-XX-XX」 using English numbers

下記のサイトへ移動し、「Download」をクリック

<https://www.gnu.org/software/octave/>

おそらく「octave」で検索すればすぐに行ける。



The screenshot shows the GNU Octave website. At the top is a navigation bar with links: About, Donate, Download, Get Involved, News, Support/Help, and Docs. Below the navigation bar is a large 3D plot of a mathematical function, likely a Gaussian or similar surface, rendered in a wireframe style with a color gradient from blue to yellow. To the right of the plot is the GNU Octave logo and the text "Scientific Programming Language". Below this, there is a list of features: "Powerful mathematics-oriented syntax with built-in plotting and visualization tools", "Free software, runs on GNU/Linux, macOS, BSD, and Windows", and "Drop-in compatible with many Matlab scripts". Below the list is a blue button labeled "Download" with a white number "1" to its left, and a blue button labeled "Docs" to its right. A red arrow points to the "Download" button with the text "Click here". Below the buttons is a section titled "Syntax Examples" with a paragraph of text and a code block showing a system of linear equations.

GNU Octave

About Donate Download Get Involved News Support/Help Docs

GNU Octave

Scientific Programming Language

- Powerful mathematics-oriented syntax with built-in plotting and visualization tools
- Free software, runs on GNU/Linux, macOS, BSD, and Windows
- Drop-in compatible with many Matlab scripts

1 Download Docs

▲ Click here

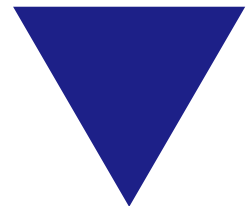
Syntax Examples

The Octave syntax is largely compatible with Matlab. The Octave interpreter can be run in GUI mode, as a console, or invoked as part of a shell script. More Octave examples can be found in [the wiki](#).

Solve systems of equations with linear algebra operations on **vectors** and **matrices**.

```
b = [4; 9; 2] # Column vector
A = [ 3 4 5;
      1 3 1;
```

もしくは
下へスクロール



“Windows” を選択し, PCが 32bit/64bit のいずれであるかを確認しダウンロード

Install

[Source](#)[GNU/Linux](#)[macOS](#)[BSD](#)**2**[Windows](#)

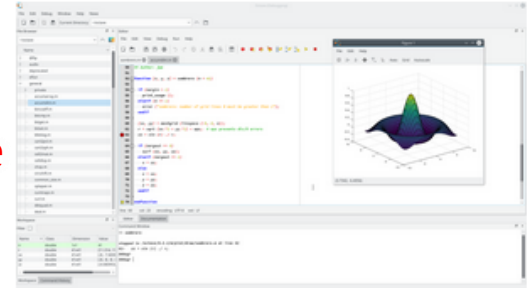
The latest stable version is GNU Octave 4.4.0:

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- [octave-4.4.0-w32-installer.exe](#) (~ 198 MB) [signature]
- [octave-4.4.0-w64_1-installer.exe](#) (~ 205 MB) [signature]
- [octave-4.4.0-w32.7z](#) (~ 185 MB) [signature]
- [octave-4.4.0-w64_1.7z](#) (~ 219 MB) [signature]
- [octave-4.4.0-w32.zip](#) (~ 323 MB) [signature]
- [octave-4.4.0-w64_1.zip](#) (~ 407 MB) [signature]

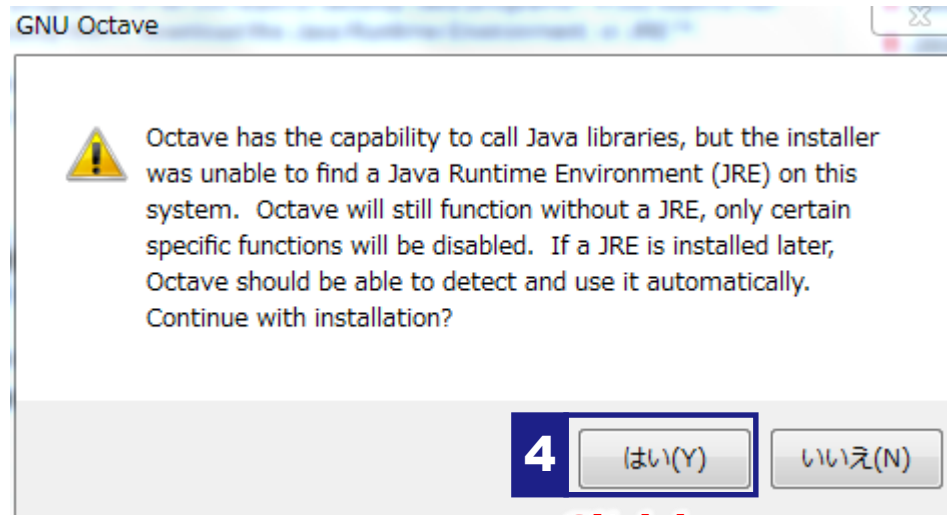
All Windows binaries with corresponding source code can be downloaded from
<https://ftp.gnu.org/gnu/octave/windows/>.

Click here



32bit か 64bit かわからない場合はうしろのページを参照

- Run the downloaded .exe file by clicking it
 - Neglect the following message about JRE(Java runtime environment) by clicking “Yes” and continuing the installation



Click here

- You will have to wait for a few minutes until the completion



予想される質問

起動時にTemporary file についてエラーが出る.

GUI上ではOctaveは日本語を処理できません.

▶ Octaveへ至るパスの中に「日本語」が含まれているとうまく動きません.

Windows の Temporary fileのデフォルト位置:

C:\Users\¥[Username]¥AppData¥Local¥Temp

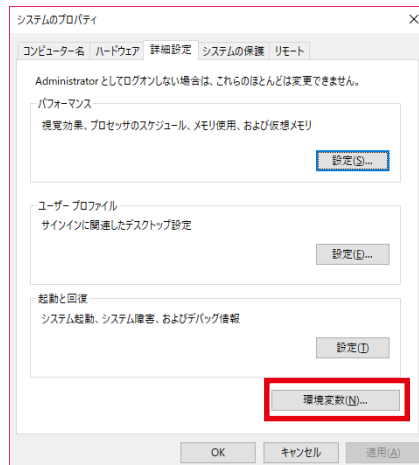
[Username]の部分は各自が登録したユーザ名

▶ 日本語名で入れていると Octave では処理ができずにエラーを表示する.

対処法:

①ユーザ名を変える ▶ OSを入れ直す.

②環境変数を変更 ▶ システムのプロパティから変更する.

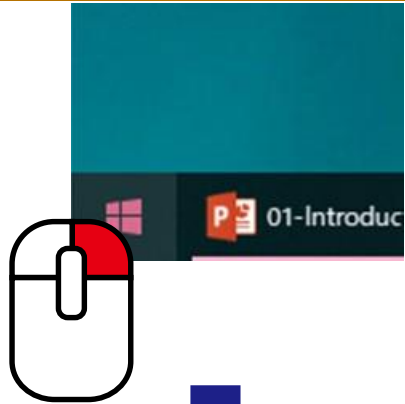




予想される質問

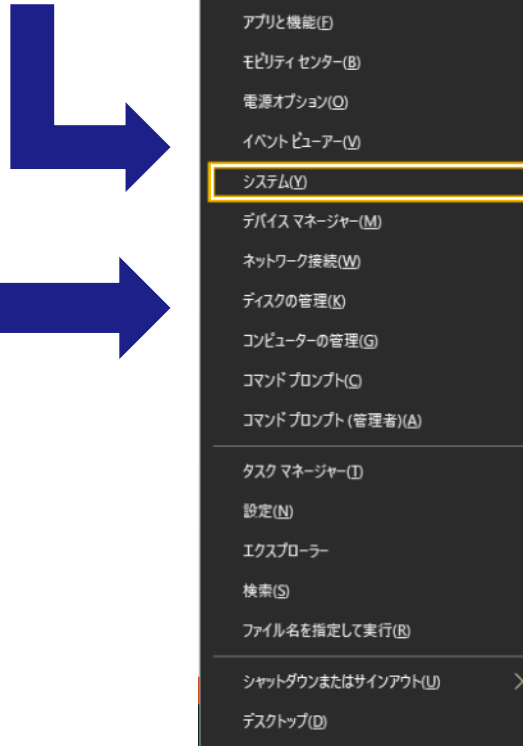
PCの仕様がわからない

マウス操作



OR

キー操作



デバイスの仕様

デバイス名
プロセッサ

実装 RAM
デバイス ID
プロダクト ID

システムの種類 64 ビット オペレーティング システム、x64 ベース プロセッサ
ペンとタッチ