# Math 242 Lab 1 Introduction to Calculus in Mathematica 

Li-An Chen<br>Department of Mathematical Sciences, University of Delaware<br>September 8, 2020

## Lab Assignment 1

- Complete ALL Lab Assignment Questions (page 5 and 6 in the lab handout) (with codes and computation results)
- Submit "lastnameLab01.nb" and "lastnameLab01.pdf" (File->Save As $\rightarrow$ pdf) on Canvas
- Deadline: Tomorrow 11:59pm
- Correct computation results (without codes) are available on Canvas $\rightarrow$ Files $\rightarrow$ Lab $\rightarrow$ Lab_01_Introduction $\rightarrow$ lab1_examples_ hints


## Basics

-"Enter" or "Return"-next line, "Shift+Enter" or "Shift+Return"-evaluate the cell (run the codes)

- "Alt+1" or "command+1" to make a "title" cell.
- "Alt+4" or "command+4" to make a "Section" cell.
-Stop evaluating---click "Alt" + "." or "command" + 64
-Remember to save the file often!


## [], \{\} and ()

- Built-in functions and constants always start with capital letter, and follow by square brackets.
- Example: Pi, E, Exp[x], Log[x] (not $\operatorname{In}[x]$ nor $\operatorname{Ln}[x]), \operatorname{Sin}[x], \operatorname{ArcSin}[x]$
- Curly braces are also for the syntax.
- Example:
- Plot[Sin[x],\{x,0,1\}]
- Plot[\{Sin[x],Cos[x]\}, \{x,0,1\}]
- For other mathematical forms., only use round parentheses
- Example:
- Correct: $\left(x^{\wedge} 2(x+1)\right) /((x+2) x)$
- Wrong: $\left[x^{\wedge} 2(x+1)\right] /\{(x+2) x\}$


## Derivatives

-Example: Compute the third derivatives of $x^{\wedge} 5$ at $\mathrm{x}=2$
-Method1: Using "expressions" -Clear[f]
-f=x^5
-D[f,\{x,3\}]/.x->2

## Derivatives

- Example: Compute the third derivatives of $x^{\wedge} 5$ at $\mathrm{x}=2$
- Method2: Using "function"
-Clear[f]
$-f[x]=x \wedge 5$
-f'"[2] (recommend)
-Or D[f[x],\{x,3\}]/.x->2


## Integrals

- Example: Integrate $\mathbf{x}^{\wedge} 5$ from 0 to 2
-Using "function"
-Clear[f]
$-f[x]=x \wedge 5$
-Integrate[f[x],\{x,0,2\}]


## Plot

- Example: Plot $\mathbf{x}^{\wedge} 5$ on the interval (0, 2)
-Clear[f]
$-\mathrm{f}[\mathrm{x}]=\mathrm{x}^{\wedge} 5$
-Plot[f[x],\{x,0,2\}]


## Find a function

- Example: How to type square root of $x$ ?
- Go to Help $\rightarrow$ Wolfram Documentation and search "square root"



## Find a function

## - Example: How to type square root of $x$ ?

|  | 柬 Search Results: square roots | $100 \% \vee$ |
| :--- | :--- | :--- |
| $\leftarrow \rightarrow$ square roots | Q |  |

## Search Results

1-10 of 1032 for square roots

So we want Sqrt[x]. zqritoxoptions suittin symbol
Click this "Sqrt" to see artBoxoptions is an option that specifies settings for SartBox objects.
more example. sqritBox Built-in Symbol
1 SqrtBox[ x$]$ is a low-level box construct that represents the displayed object Sqrt[x] in notebook expressions.
Roots Built-in Symbol
Roots[lhs == rhs, var] yields a disjunction of equations which represent the roots of a polynomial equation.
Sqrt Built-in Symbol
Sqrt[z] or Sqrt[z] gives the square root of $z$.

## Wrong

## Correct

- $1 / 1+x^{\wedge} 2$
- $e^{\wedge} x$
- $\sin (x)$
- $\operatorname{Sin}^{\wedge} 3[x]$
- $\arctan (x)$
- ClearAll, or Clear
- $1 /\left(1+x^{\wedge} 2\right)$
- $\operatorname{Exp}[x]$ or $E^{\wedge} x$
- $\operatorname{Sin}[x]$
- $(\operatorname{Sin}[x])^{\wedge} 3$
- ArcTan[x]
- Clear[ $[\mathrm{f}$, or Clear[ $\mathrm{f}, \mathrm{x}, \mathrm{a}]$


## Wrong

## Correct

- $f=x^{\wedge} 5$
f" ${ }^{[x]}$
f" ${ }^{\prime}$ [3]
$\mathrm{D}[\mathrm{f}[\mathrm{x}],\{\mathrm{x}, 2\}]$
- $f[x]=x^{\wedge} 5$
f"[3]
- $f[x]=x^{\wedge} 5$
f"
$D[f,\{x, 2\}]$
- $f=x^{\wedge} 5$
$\mathrm{D}[\mathrm{f},\{\mathrm{x}, 2\}]$
$D[f,\{x, 2\}] / . x->3$
- $f[x]=x^{\wedge} 5$
f' ${ }^{[x]}$
f'[3]
$\mathrm{D}[\mathrm{f}[\mathrm{x}],\{\mathrm{x}, 2\}]$
$\mathrm{D}[\mathrm{f}[\mathrm{x}],\{x, 2\}] / . x->3$

