**Please select and type in gray boxes ( ).**

* **To select a box, tap (left click) on the box by mouse or locate the cursor in the beginning and hold shift and use the right arrow ([Shift] ).**
* **Type the given keystroke sequence or follow the menu options**

# Adding Equations – Point & Click vs. Keyboard

* Point & Click
  + >Insert (>Symbols) >Equations

* + Click or key [] away
* Keyboard
  + [Alt=] to switch
    - [Ctrl=] in Mac

* + [Alt=] to Switch back
    - [Ctrl=] in Mac

# Getting Started – Notations

* Single-character named keys
  + Examples: 0 1 9 a b z A B Z - + \_ / \ [ ]
  + Keystrokes x-1 means press x, then - and then 1.
* Special / Multiple-character named keys:
  + Examples – Windows: [Alt] [Ctrl] [Shift] [ESC] [PgUp] [Enter]
  + Examples – Mac: [Option], [Ctrl], ⌘ [Shift] [ESC] [PgUp] [Enter]
  + Keystroke x[space]-[space]1 means press x, spacebar, -, spacebar and 1.
  + Keystroke x-1 and x - 1 are the same (extra space is added for readability)
* Simultaneous keystrokes are underlined
  + Keystroke combination [Alt]= (Mac: [ctrl]= ) switches between text and formula
  + In general, [Alt]= (Mac: [ctrl]= ) is omitted for simplicity; being in math mode is assumed.
  + Some command need a [space] stroke to be completed; not always, though.

# Getting Started – Equations & Inequalities

* Creating the first equation

[Alt=] x=12 [Alt=] (Mac: [Ctrl=] x=12 [Ctrl=] )

* Inequalities:

10 \le [space] x <= 12 , x \ne [space] 0

# Getting Started – Basic Operations

* Addition, Subtractions:

x+y-12 \ne [space] 0

(1+2)-3=1+2-3=1+(2-3)

# Getting Started – Basic Operations

* Multiplication:

2x+3yz=54

2 \times [space] x+y \cdot [space] z=54

# Getting Started – Basic Operations

* Division:

2 \div [space] 3=2 / 3 [space] = 2 \ / 3

* NOTE: [space] after 2/3 is optional since followed by more keystrokes.

2+3 / 4+5 \ne ( 2+3 ) / ( 4+5 )

# Getting Started –Superscripts/Subscripts

* Superscripts (Exponents):

2 ^ 10 [space] =1024

2 ^ 10 =1024

2 ^ 10+2 \ne 2 ^ ( 10+2 ) [space]

# Getting Started – Superscripts/Subscripts

* Subscripts:

x \_ i [space] y \_ j [space] = y\_j[space]x\_i[space]

x\_iy\_j \ne [space] xi\cdot[space]y\_j[space]

* Subscripts/Superscript:

x\_1^2 [space] x^1\_2 \ne[space] x\_3^3[space]

# Getting Started – Log

* Log:

log[space]x\_1^(y\_2)[space]=y\_2[space]log[space] x\_1[space]

* Note: Exponents/superscripts, subscripts, logs, … and brackets like (), [] and {}, create a subspace for their own formulas. Use to navigate away from those subspaces, when their formula is completed.

log\_2[space]8=3

# Getting Started – Arrows

->\to\rightarrow\leftarrow\uparrow\downarrow[space]

\Rightarrow\Leftarrow\Uparrow\Downarrow[space]

\nearrow\nwarrow\swarrow\searrow[space]

\Leftrightarrow\leftrightarrow[space]

# Getting Started – Symbols

\infty[space]

\approx\propto[space]

\sim\equiv\cong[space]~=[space]

\forall\exists\ni\in\notin [space]

\epsilon\varepsilon [space]

\delta\Delta[space]

\alpha\beta\gamma[space]

\subset\cup\cap[space]

# Getting Started – Limit

lim\_(x\to\infty)[space]x/(x+2)[space] = 1

lim\_(x\to[space]1^+)[space] x^2[space]= lim\_(x\searrow[space]1)[space] x^2[space]= 1

# Getting Started – Derivative

f ’ (x)=f^((1))[space](x)=d/dx [space] f(x)=y’

\partial^2 / (\partial[space]x\partial[space] y) [space]=F\_(xy) [space] (x,y)=f(x,y)

# Getting Started – Integrals

F(x)=\int\_(-\infty)^x [space] f(t) [space] dt

\int\_0^1[space] \int\_0^(1-x)[space] (3x+3y) dy dx = 1

\iint\_(\scriptR^2)[space] f(x,y) [space] [space] dx[space] dy = 1

# Formatting Equations – Inline vs. Display

* An **inline** equation, like , is places on the same line as other words in a text; this may not be good for busy equations like .

[Alt]=\int\_(-\infty)^\infty[space] x/2[space] dx [Alt]=

* It is better to show busy equations in **display** format:

[Alt]=\int\_(-\infty)^\infty[space] x/2[space] dx [Alt]=

where the equation is left alone on its own line.

# Formatting Equations – Adding Text

* Adding Text to Display format:

x-1=0 [space] “for" [space] [space] x=1

\forall \varepsilon >0 \exists \delta >0 [space] "such that" [space] [space] (\ni) [space] [space] "if" [space]

[space] |x-1|[space] <\delta [space] [space] "then" [space] [space] (\Rightarrow) [space] [space] |x^2-

1|[space] <\varepsilon [space]

# Formatting Equations – Adding Space

* Horizontal space:

a,[space] [space]b

a+2(b-a)=a+\hphantom(2(b-a))=2b-a

* Vertical space:

[2x-1]\_0^2=[2x-1\vphantom(1/2)]\_0^2=3

* Adding Space by phantom:

a+2(\phantom(\int\_0^1 [space] dx→)) =c

# Formatting Equations – Align Equation

* Aligned only at =

\eqarray(x−z&=12@−3x−2y+100z&=18)[space]

* Aligned at x, y and z (space added before signs by even &’s):

\eqarray(x&&&&-z&=12@-3x&&-2y&&+100z&=18)[space]

* Matrix (center aligned):

\pmatrix(1&2+3@2+5&6)[space]

# Numbering & Cross-Referencing Equations

* Adding a Number

x=12#(10)[enter]

* Automatically Numbering Equations (in Word, only)
  + Create an Equation Caption w/o Label:

**References > Insert Caption** (Check “Exclude label from caption” or later copy the number only)

* + Copy the caption and paste instead of your equation number

* + Use the updated equation as template (Copy and Paste)

* + Select all equations (or all text [Ctrl]A)
  + Update the equation numbers by pressing [F9]
* Cross-Referencing Automatically Numbered Equations

**Insert > Links > Cross-reference** (“Reference Type” =Equation)

# Extending Your Skills – Within Office

* Use **Equation Tools > Design Tab**:
  + Use Point and Click to construct your formula

Click on **Bracket > Common Brackets**

* + Find symbols with no defined keystroke

Click on **Symbols > Negated Relations >**

* + Find (re-)discover symbols with defined keystrokes

Click on **Symbols > Geometry > \angle**

# Extending Your Skills – External References

* Type LaTeX in Titanium: use **\(** … **\)** for inline and **\[**…**\]** for display

**The variable of interest is \(x\) in expression \[3ax^3-4y.\]**

* Type LaTeX in MATLAB’s live editor:
  + Enter a similar to Word’s Unicode: [Shift][Ctrl]E ([Shift]⌘E)
  + Open a LaTeX GUI to enter formula: [Shift][Ctrl]L ([Shift]⌘ L)
  + Type LaTeX commands directly: $...$[space] or $$...$$[space]
* Type LaTeX in R-Markdown or R-Notebook documents

**For inline use $X$ or \(Y\);**

**for display use \[f(x)=2x+1\] or $$g(y)=20x-20z.$$**

# Extending Your Skills – External References

* Typing Mathematics in Microsoft Word, <https://en.wikibooks.org/wiki/Typing_Mathematics_in_Microsoft_Word>
* Using Keystrokes to Write Equations in Microsoft Office 2007 Equation Editor by Tomas B. Co, <https://pages.mtu.edu/~tbco/cm416/EquationEditor_main.pdf>
* Microsoft Word Equation Editor, by Khitron Igal, <https://www.cs.bgu.ac.il/~khitron/Equation%20Editor.pdf>
* The Word 2007/2010 Equation Editor by Dr. Iztok Hozo, <http://www.iun.edu/~mathiho/useful/Equation%20Editor%20Shortcut%20Commands.pdf>