# Dictating mathematics into LyX using Caster

Mike Roberts

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## Contents

## 1 Introduction

- **All of these bindings can be easily changed by modifying mathfly/config/lyx.toml in any text editor.**

- (option a | option b) means that both commands will do the same thing.

- Square brackets means that the word(s) inside are optional, the command will work with or without them.

# 2  Miscellaneous

| | |
|---|---|
| math mode | Begins a new mathematical dictation environment, necessary for all maths dictation. |
| new line | Begins a new mathematical dictation line. |
| fraction | Creates a fraction. anything highlighted will form the numerator. |
| over | Creates a fraction with the previous element as the numerator (e.g. "five over three") |
| (super [script] \| to the power) | Superscript |
| sub [script] | Subscript |
| squared | Superscript 2 |
| cubed | Superscript 3 |
| inverse | Superscript -1 |
| parens | Parentheses |
| square brackets | Square brackets |
| curly brackets | Curly brackets |
| absolute | Create two bars and moves inside them |
| degrees | Insert a degree symbol |
| summation | $\sum_b^a$ |
| blank summation | $\sum$ |
| (summation \| sum) to N | $\sum_?^n$ |
| product | $\prod_b^a$ |
| blank product | $\prod$ |
| product to N | $\sum_?^n$ |
| limit | $\lim_?$ |
| blank limit | $\lim$ |
| label above | Add a label above the selected text |
| label below | Add a label below the selected text |

# 3 Letters

## 3.1 Greek

By default, all of these commands must be prefixed with "greek" for lowercase or "greek big" for uppercase. This behaviour can be changed by modifying greek_prefix and capitals_prefix.

| | | |
|---|---|---|
| alpha | $\alpha$ | |
| beater | $\beta$ | |
| gamma | $\gamma$ | $\Gamma$ |
| delta | $\delta$ | $\Delta$ |
| epsilon | $\varepsilon$ | |
| zita | $\zeta$ | |
| eater | $\eta$ | |
| theta | $\theta$ | $\Theta$ |
| iota | $\iota$ | |
| kappa | $\kappa$ | |
| lambda | $\lambda$ | $\Lambda$ |
| mu | $\mu$ | |
| new | $\nu$ | |
| zee | $\xi$ | $\Xi$ |
| pie | $\pi$ | $\Pi$ |
| row | $\rho$ | |
| sigma | $\sigma$ | $\Sigma$ |
| tau | $\tau$ | |
| upsilon | $\upsilon$ | $\Upsilon$ |
| phi | $\phi$ | $\Phi$ |
| chi | $\chi$ | |
| sigh | $\psi$ | $\Psi$ |
| omega | $\omega$ | $\Omega$ |

## 3.2 Accents

These commands add accents above the highlighted text, or create an empty accent if nothing is highlighted.

| | |
|---|---|
| accent hat | $\hat{a}$ |
| accent tilde | $\tilde{a}$ |
| accent dot | $\dot{a}$ |
| accent double dot | $\ddot{a}$ |
| accent bar | $\bar{a}$ |

# 4   Symbols

In order to avoid clutter and misrecognition, mathematical symbols are split up into two distinct groups: common and uncommon. By default, common symbols (e.g. integral) need no prefix, while uncommon symbols (e.g. up arrow) are prefixed with "symbol". The prefixes are defined by symbol1_prefix and symbol2_prefix. It is expected that you will want to move symbols which you happen to use frequently or infrequently between the two groups, or change/remove the prefixes to your liking. There is a trade-off to be made between recognition accuracy and speed of dictation.

## 4.1   Common symbols

| | |
|---|---|
| [square] root | $\sqrt{x}$ |
| generic root | $\sqrt[n]{x}$ |
| integral | $\int$ |
| double integral | $\int\int$ |
| triple integral | $\int\int\int$ |
| times | $\times$ |
| divide | $\div$ |
| stop | $\cdot$ |
| plus or minus | $\pm$ |
| partial | $\partial$ |
| (nice frack \| nice fraction) | a/b |
| binomial | $\binom{a}{b}$ |
| infinity | $\infty$ |
| dot dot dot | $\ldots$ |
| greater [than] [or] equal [to] | $\geq$ |
| less [than] [or] equal [to] | $\leq$ |
| not equal [to] | $\neq$ |
| approximately [equal] [to] | $\approx$ |

| | |
|---|---|
| proportional [to] | $\propto$ |
| preference less [than] | $\prec$ |
| preference less equals | $\preceq$ |
| preference greater [than] | $\succ$ |
| preference greater equals | $\succeq$ |
| sine | sin |
| cosine | cos |
| tangent | tan |
| secant | sec |
| cosecant | csc |
| cotangent | cot |
| arc sine | arcsin |
| arc cosine | arccos |
| arc tan | arctan |
| hyperbolic sine | sinh |
| hyperbolic cosine | cosh |
| hyperbolic tangent | tanh |
| hyperbolic cotangent | coth |
| degree | deg |
| determinant | det |
| dimension | dim |
| exponential | exp |
| (natural (log \| logarithm) \| log natural) | ln |
| logarithm | log |
| argument | arg |
| maximum | max |
| minimum | min |
| (modulo \| modulus) | mod |
| supremum | sup |
| infimum | inf |
| probability | Pr |
| there exists | $\exists$ |
| member [of] | $\in$ |
| real numbers | $\mathbb{R}$ |
| complex numbers | $\mathbb{C}$ |
| integer numbers | $\mathbb{Z}$ |
| rational numbers | $\mathbb{Q}$ |
| natural numbers | $\mathbb{N}$ |

| | |
|---|---|
| for all | $\forall$ |
| subset | $\subset$ |
| superset | $\supset$ |
| strict subset | $\subsetneq$ |
| strict superset | $\supsetneq$ |
| intersection | $\cap$ |
| union | $\cup$ |
| logic and | $\wedge$ |
| logic or | $\vee$ |
| logic not | $\neg$ |
| left arrow | $\leftarrow$ |
| right arrow | $\rightarrow$ |
| up arrow | $\uparrow$ |
| down arrow | $\downarrow$ |
| left right arrow | $\leftrightarrow$ |
| maps to | $\mapsto$ |
| oh plus | $\oplus$ |
| oh times | $\otimes$ |
| big oh plus | $\bigoplus$ |
| big oh times | $\bigotimes$ |
| diagonal dots | $\ddots$ |
| horizontal dots | $\cdots$ |
| vertical dots | $\vdots$ |

## 4.2   Less common symbols

Prefix with "symbol"

| | |
|---|---|
| GCD | gcd |
| cat hom | hom |
| kernel | ker |

# 5 Text modes

These commands allow you to insert various forms of regular text into a mathematical environment. They should all be prefixed with "text".

| | |
|---|---|
| (beebee\|blackboard bold \| blackboard) | $\mathbb{RNZ}$ |
| roman | Sampletext |
| bold | **Sampletext** |
| sans serif | Sampletext |
| italic | *Sampletext* |
| typewriter | `Sampletext` |

# 6 Fractions

There are a few ways of easily inserting fractions:

- Use the "fraction" command, and navigate through it using directions.

- Use the "over" command, which will build a fraction with the previous element as the numerator. e.g. "x-ray squared over five".

- For denominators up to 10, use their natural names, providing a number for the numerator, e.g. "five thirds".

# 7 Matrices

- To insert a matrix of a particular size, use the matrix command, e.g. "matrix three by one".

- To add or remove columns and rows, Use the command "add/remove matrix column/row".

- Matrices can be encased in brackets as expected, E.g. "parens matrix three by three".