# 1 List of commands

## 1.1 Automatic bracing

$$(X) \qquad \left(X^Y\right) \qquad \left(\frac{X}{Y}\right) \qquad [X] \qquad |X| \qquad \{X\} \qquad \{x\} \qquad \bigl\{x\bigr\} \qquad \Bigl\{x\Bigr\} \qquad \biggl\{x\biggr\}$$

$$(x) \qquad [x] \qquad |x| \qquad \{x\}$$

$$|a| \qquad \Big|a\Big| \qquad |\frac{X}{Y}| \qquad \|a\| \qquad \Big\|a\Big\| \qquad \|\frac{X}{Y}\|$$

$$x\Big|_0^\infty \qquad \left(x\right|_0^\infty \qquad \left[x\right|_0^\infty \qquad \left[\sum_{X=0}^{N}\right|_0^\infty \qquad \left[\sum_{X=0}^{N}\right|_0^\infty$$

$$\mathcal{O}\left(x^2\right) \qquad \mathcal{O}\Big(x^2\Big) \qquad \mathcal{O}(\frac{X}{Y}) \qquad [A,B] \qquad \Big[A,B\Big] \qquad [A,\frac{X}{Y}] \qquad \{A,B\} \qquad \{A,B\}$$

## 1.2 Vector notation

$$\mathbf{a} \qquad \boldsymbol{a} \qquad \vec{\mathbf{a}} \qquad \vec{\boldsymbol{a}} \qquad \hat{\mathbf{a}} \qquad \hat{\boldsymbol{a}}$$

$$\cdot \qquad \times \qquad \times$$

$$\boldsymbol{\nabla} \qquad \boldsymbol{\nabla}\Psi \qquad \boldsymbol{\nabla}\left(\Psi + X^Y\right) \qquad \boldsymbol{\nabla}\left[\Psi + X^Y\right]$$

$$\boldsymbol{\nabla}\cdot \qquad \boldsymbol{\nabla}\cdot\mathbf{a} \qquad \boldsymbol{\nabla}\cdot\left(\mathbf{a} + X^Y\right) \qquad \boldsymbol{\nabla}\cdot\left[\mathbf{a} + X^Y\right]$$

$$\boldsymbol{\nabla}\times \qquad \boldsymbol{\nabla}\times\mathbf{a} \qquad \boldsymbol{\nabla}\times\left(\mathbf{a} + X^Y\right) \qquad \boldsymbol{\nabla}\times\left[\mathbf{a} + X^Y\right]$$

$$\nabla^2 \qquad \nabla^2\Psi \qquad \nabla^2\left(\Psi + X^Y\right) \qquad \nabla^2\left[\Psi + X^Y\right]$$

## 1.3 Operators

$$\sin\left(\frac{X}{Y}\right) \qquad \sin^2(x) \qquad \sin x$$

But

$$\sin[\frac{X}{Y}] \qquad \sin[x][\frac{X}{Y}] \qquad \sin[x]\frac{X}{Y} \qquad \sin\{\frac{X}{Y}\} \qquad \sin[x]\{\frac{X}{Y}\}$$

| | | | |
|---|---|---|---|
| $\sin(x)$ | $\sinh(x)$ | $\arcsin(x)$ | $\mathrm{asin}(x)$ |
| $\cos(x)$ | $\cosh(x)$ | $\arccos(x)$ | $\mathrm{acos}(x)$ |
| $\tan(x)$ | $\tanh(x)$ | $\arctan(x)$ | $\mathrm{atan}(x)$ |
| $\csc(x)$ | $\mathrm{csch}(x)$ | $\mathrm{arccsc}(x)$ | $\mathrm{acsc}(x)$ |
| $\sec(x)$ | $\mathrm{sech}(x)$ | $\mathrm{arcsec}(x)$ | $\mathrm{asec}(x)$ |
| $\cot(x)$ | $\coth(x)$ | $\mathrm{arccot}(x)$ | $\mathrm{acot}(x)$ |

$$\exp\bigl(X^Y\bigr) \qquad \log\bigl(X^Y\bigr) \qquad \ln\bigl(X^Y\bigr) \qquad \det\bigl(X^Y\bigr) \qquad \Pr\bigl(X^Y\bigr)$$

$$\operatorname{tr}\rho \qquad \operatorname{tr}\bigl(X^Y\bigr) \qquad \operatorname{Tr}\rho \qquad \operatorname{rank}M \qquad \operatorname{erf}(x) \qquad \operatorname{Res}[f(z)]$$

$$\mathcal{P}\int f(z)\,\mathrm{d}z \qquad \mathrm{P.V.}\int f(z)\,\mathrm{d}z \qquad \operatorname{Re}\{z\} \qquad \Re \qquad \operatorname{Im}\{z\} \qquad \Im$$

But

$$\operatorname{Re}(\frac{X}{Y}) \qquad \operatorname{Re}[\frac{X}{Y}] \qquad \operatorname{Im}(\frac{X}{Y}) \qquad \operatorname{Im}[\frac{X}{Y}]$$

## 1.4 Quick quad text

$$[\quad\text{word or phrase}\quad][\text{word or phrase}\quad]$$

$$[,\quad],[\quad\text{c.c.}\quad],[\quad\text{if}\quad],[\quad\text{then}\quad],[\quad\text{else}\quad],[\quad\text{otherwise}\quad],[\quad\text{unless}\quad],[\quad\text{given}\quad]$$

$$[\quad\text{using}\quad],[\quad\text{assume}\quad],[\quad\text{since}\quad],[\quad\text{let}\quad],[\quad\text{for}\quad],[\quad\text{all}\quad],[\quad\text{even}\quad],[\quad\text{odd}\quad],$$
$$[\quad\text{integer}\quad],[\quad\text{and}\quad],[\quad\text{or}\quad],[\quad\text{as}\quad],[\quad\text{in}\quad]$$

## 1.5 Derivatives

$$\mathrm{d} \qquad \mathrm{d}x \qquad \mathrm{d}x \qquad \mathrm{d}^3x \qquad \mathrm{d}(\cos\theta)$$

$$\frac{\mathrm{d}}{\mathrm{d}x} \qquad \frac{\mathrm{d}}{\mathrm{d}x}f \qquad \frac{\mathrm{d}f}{\mathrm{d}x} \qquad \frac{\mathrm{d}^n f}{\mathrm{d}x^n} \qquad \frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{X}{Y}\right) \qquad \mathrm{d}f/\mathrm{d}x$$

$$\frac{\partial}{\partial x} \qquad \frac{\partial}{\partial x}f \qquad \frac{\partial}{\partial x} \qquad \frac{\partial f}{\partial x} \qquad \frac{\partial^n f}{\partial x^n} \qquad \frac{\partial}{\partial x}\left(\frac{X}{Y}\right) \qquad \partial f/\partial x$$

$$\delta F[g(x)] \qquad \delta(E-TS) \qquad \frac{\delta}{\delta g} \qquad \frac{\delta F}{\delta g} \qquad \frac{\delta}{\delta V}(E-TS) \qquad \delta F/\delta x$$

But

$$\mathrm{d}^2[\frac{X}{Y}]$$

And multiple derivatives, sorta; But only for partial:

$$\frac{\partial^2 f}{\partial x\partial y} \qquad \frac{\partial^2 f}{\partial x\partial y}z \qquad \frac{\partial^2 f}{\partial x\partial y}z \qquad \frac{\partial x}{\partial y}$$

$$\frac{\mathrm{d}f}{\mathrm{d}x}y \qquad \frac{\delta F}{\delta f}g$$

## 1.6 Dirac bra-ket notation

$$\langle\phi|\psi\rangle \quad \text{as opposed to} \quad \langle\phi|\psi\rangle$$
$$\langle\phi|\,|\psi\rangle\langle\xi|\,. \quad \text{as opposed to} \quad \langle\phi|\psi\rangle\,\langle\xi|$$

$$\left|X^Y\right\rangle \qquad |X^Y\rangle \qquad \left\langle X^Y\right| \qquad \langle X^Y|$$

$$\langle\phi|\psi\rangle \qquad \left\langle\phi\middle|X^Y\right\rangle \qquad \langle\phi|X^Y\rangle \qquad \langle\phi|X^Y\rangle \qquad \langle\phi|X^Y\rangle$$

$$\langle a|b\rangle \qquad \langle a|a\rangle \qquad \left\langle a\middle|X^Y\right\rangle \qquad \langle a|X^Y\rangle$$

$$\langle a|b\rangle \qquad |a\rangle\langle b| \qquad |a\rangle\langle a| \qquad \left|a\right\rangle\left\langle X^Y\right| \qquad |a\rangle\langle X^Y| \qquad |a\rangle\langle b|$$

$$|a\rangle\langle b| \qquad \langle A\rangle \qquad \langle\Psi|A|\Psi\rangle \qquad \langle\Psi|A|\Psi\rangle \qquad \langle\Psi|\frac{X}{Y}|\Psi\rangle \qquad \langle X^Y|\frac{X}{Y}|X^Y\rangle \qquad \left\langle\Psi\middle|\frac{X}{Y}\middle|\Psi\right\rangle$$

$$\langle n|A|m\rangle \qquad \langle n|A|m\rangle \qquad \langle n|\frac{X}{Y}|m\rangle \qquad \langle n|\frac{X}{Y}|X^Y\rangle \qquad \left\langle n\middle|\frac{X}{Y}\middle|m\right\rangle$$

## 1.7 Matrix macros

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \\ a & b \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & a \\ 0 & 1 & b \\ c & d & e \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & a \\ 0 & 1 & b \\ c & d & e \end{pmatrix}$$

But, alignment is illusion

$$\begin{pmatrix} 1 \quad 0 & & \dfrac{x}{y} \\ 0 \quad 1 & & b \\ u+v+w+x+y+z & d & e \end{pmatrix}$$

$$\begin{matrix} a & b \\ c & d \end{matrix} \qquad \begin{pmatrix} a & b \\ c & d \end{pmatrix} \qquad \begin{Bmatrix} a & b \\ c & d \end{Bmatrix} \qquad \begin{bmatrix} a & b \\ c & d \end{bmatrix} \qquad \begin{vmatrix} a & b \\ c & d \end{vmatrix} \qquad \begin{smallmatrix} a & b \\ c & d \end{smallmatrix} \qquad \begin{vmatrix} a & b \\ c & d \end{vmatrix} \qquad \left|\begin{smallmatrix} a & b \\ c & d \end{smallmatrix}\right|$$

$$\left(\begin{smallmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{smallmatrix}\right) \qquad \left(\begin{smallmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \end{smallmatrix}\right) \qquad \left(\begin{smallmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{smallmatrix}\right) \qquad \left(\begin{smallmatrix} a_1 \\ a_2 \\ a_3 \end{smallmatrix}\right) \qquad \left(\begin{smallmatrix} a_1 & a_2 & a_3 \end{smallmatrix}\right) \qquad \left(\begin{smallmatrix} 0 & 0 \\ 0 & 0 \end{smallmatrix}\right)$$

$\left(\begin{smallmatrix}1 & 0\\ 0 & 1\end{smallmatrix}\right)$ $\left(\begin{smallmatrix}0 & 1\\ 1 & 0\end{smallmatrix}\right)$ $\left(\begin{smallmatrix}0 & -i\\ i & 0\end{smallmatrix}\right)$ $\left(\begin{smallmatrix}1 & 0\\ 0 & -1\end{smallmatrix}\right)$

$$\begin{pmatrix}1 & & \\ & 2 & \\ & & 3\end{pmatrix} \quad \begin{pmatrix}1 & 0\\ 0 & 2\end{pmatrix} \quad \begin{pmatrix}1 & & \\ & 2 & 3\\ & 4 & 5\end{pmatrix} \quad \begin{pmatrix} & & 1\\ & 2 & \\ 3 & & \end{pmatrix}$$