Основи на LaTeX

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Bracketing & delimiters

```
\begin{equation*}
|\cdots|, (\cdots), [\cdots],
\langle\cdots\rangle,
\{\cdots\}, \updownarrow
\end{equation*}
```

$$|\cdots|, (\cdots), [\cdots], \langle\cdots\rangle, \{\cdots\}, \updownarrow$$

```
$$
{a,b,c} \neq \{a,b,c\}
$$
```

$$a, b, c \neq \{a, b, c\}$$

```
\begin{equation*}
1 + \left(\frac{1}{1-x^{2}}
\right)^3 \qquad
\left. :\frac{~}{~}\right)
\end{equation*}
```

$$1 + \left(\frac{1}{1-x^2}\right)^3 \qquad \left. :\frac{~}{~}\right)$$

```
$\Big((x+1)(x-1)\Big)^{2}$\\
$\big( \Big( \bigg( \Bigg( \quad
\big\} \Big\} \bigg\} \Bigg\} \quad
\big\| \Big\| \bigg\| \Bigg\| \quad
\big\Downarrow \Big\Downarrow
\bigg\Downarrow \Bigg\Downarrow$
```

$$\Big((x+1)(x-1)\Big)^2$$

$$\big(\Big(\bigg(\Bigg(\quad \big\} \Big\} \bigg\} \Bigg\} \quad \big\| \Big\| \bigg\| \Bigg\| \quad \big\Downarrow \Big\Downarrow \bigg\Downarrow \Bigg\Downarrow$$

Multiple Equations

```
\begin{eqnarray}
\gamma = \cos\alpha \\
\delta = \sin\beta
\end{eqnarray}
```

$$\gamma = \cos\alpha \quad (1)$$
$$\delta = \sin\beta \quad (2)$$

```
\begin{subequations}
\begin{eqnarray}
\nabla f = \zeta \\
\sigma = \mathbf{F}
\end{eqnarray}
\end{subequations}
```

$$\nabla f = \zeta \quad (3a)$$
$$\sigma = \boldsymbol{F} \quad (3b)$$

```
\begin{eqnarray*}
\gamma & = \cos\alpha \\
\delta & = \sin\beta
\end{eqnarray*}
```

$$\gamma = \cos\alpha$$
$$\delta = \sin\beta$$

```
\begin{eqnarray}
\pi & = \alpha + \beta \nonumber \\
    & = \alpha + \beta
\end{eqnarray}
```

$$\pi = \alpha + \beta$$
$$= \alpha + \beta \quad (4)$$

Multiple Equations

```
\begin{align*}
a   &= b + c  \\
    &= d + e
\end{align*}
```

$$a = b + c$$
$$= d + e$$

Problems with traditional commands

```
\begin{align*}
a   &= & b + c  \\
    &= & d + e
\end{align*}
```

$$a = \quad b + c$$
$$= \quad d + e$$

```
\begin{eqnarray*}
a   &= & b + c  \\
    &= & d + e
\end{eqnarray*}
```

$$a \quad = \quad b + c$$
$$= \quad d + e$$

IEEEeqnarray Environment

```
\usepackage[retainorgcmds]{IEEEtrantools}
```

```
\begin{IEEEeqnarray}{rCl}
a &=& b + c
\\
&=& d + e + f + g + h
+ i + j + k \nonumber\\
&&+ l + m + n + o
\\
&=& p + q + r + s
\end{IEEEeqnarray}
```

$$
\begin{aligned}
a &= b + c && (5)\\
&= d + e + f + g + h + i + j + k\\
&\quad + l + m + n + o && (6)\\
&= p + q + r + s && (7)
\end{aligned}
$$

```
\begin{IEEEeqnarray}{rCl}
a &=& b + c
\\
&=& d + e + f + g + h
+ i + j + k
\IEEEeqnarraynumspace\\
&=& l + m + n.
\end{IEEEeqnarray}
```

$$
\begin{aligned}
a &= b + c && (8)\\
&= d + e + f + g + h + i + j + k && (9)\\
&= l + m + n. && (10)
\end{aligned}
$$

IEEEeqnarray Environment

```
\usepackage[retainorgcmds]{IEEEtrantools}
```

```
\begin{IEEEeqnarray*}{rCl}
a &=& b + c                          \\
  &=& d + e \IEEEyesnumber           \\
  &=& p + q + r + s
\end{IEEEeqnarray}
```

$$\begin{aligned} a &= b + c \\ &= d + e \qquad (11) \\ &= p + q + r + s \end{aligned}$$

```
\begin{IEEEeqnarray}{rCl}
a &=& b + c
\IEEEyessubnumber\\
  &=& d + e
\nonumber\\
  &=& f + g
\IEEEyessubnumber
\end{IEEEeqnarray}
```

$$\begin{aligned} a &= b + c \qquad (11a) \\ &= d + e \\ &= f + g \qquad (11b) \end{aligned}$$

Arrays

```
\begin{equation*}
  \mathbf{X} = \left(
  \begin{array}{ccc}
     x_1     &  x_2   & \ldots  \\
     x_3     &  x_4   & \ldots  \\
     \vdots & \vdots & \ddots
  \end{array} \right)
\end{equation*}
```

$$\boldsymbol{X} = \left(\begin{array}{ccc} x_1 & x_2 & \ldots \\ x_3 & x_4 & \ldots \\ \vdots & \vdots & \ddots \end{array} \right)$$

```
\begin{equation*}
|x| = \left\{
\begin{array}{rl}
   -x  &  \text{if } x < 0,  \\
    0  &  \text{if } x = 0,  \\
    x  &  \text{if } x > 0.
\end{array} \right.
\end{equation*}
```

$$|x| = \left\{ \begin{array}{rl} -x & \text{if } x < 0, \\ 0 & \text{if } x = 0, \\ x & \text{if } x > 0. \end{array} \right.$$

```
\begin{equation*}
|x| =
\begin{cases}
   -x & \text{if } x < 0,  \\
    0 & \text{if } x = 0,  \\
    x & \text{if } x > 0.
\end{cases}
\end{equation*}
```

$$|x| = \begin{cases} -x & \text{if } x < 0, \\ 0 & \text{if } x = 0, \\ x & \text{if } x > 0. \end{cases}$$

Matrices

Matrix environment:

`matrix`, `pmatrix` (, `bmatrix` [, `Bmatrix` {, `vmatrix` | and `Vmatrix` ||.

```
\begin{equation*}
  \begin{matrix}
    1 & 2 \\
    3 & 4
  \end{matrix}
  \qquad
  \begin{bmatrix}
    p_{11} & p_{12} & \ldots & p_{1n}    \\
    p_{21} & p_{22} & \ldots & & p_{2n} \\
    \vdots & \vdots & \ddots & \vdots    \\
    p_{m1} & p_{m2} & \ldots & p_{mn}
  \end{bmatrix}
\end{equation*}
```

$$\begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix} \qquad \begin{bmatrix} p_{11} & p_{12} & \ldots & p_{1n} \\ p_{21} & p_{22} & \ldots & p_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ p_{m1} & p_{m2} & \ldots & p_{mn} \end{bmatrix}$$

Spacing

quad = width of 'M' of the current font.

$$\backslash, = \frac{3}{18}\,\texttt{quad} - \backslash: = \frac{4}{18}\,\texttt{quad} - \backslash; = \frac{5}{18}\,\texttt{quad}$$

$$\backslash! = -\frac{3}{18}\,\texttt{quad}$$

```
\begin{equation*}
  \int_1^2 \ln x \mathrm{d}x
  \qquad
  \int_1^2 \ln x \,\mathrm{d}x
\end{equation*}
```

$$\int_1^2 \ln x \mathrm{d}x \qquad \int_1^2 \ln x \,\mathrm{d}x$$

```
\newcommand{\ud}{\,\mathrm{d}}
\begin{IEEEeqnarray*}{c}
  \int\int f(x)g(y)
  \ud x \ud y \\
  \int\!\!\!\int
  f(x)g(y) \ud x \ud y \\
  \iint f(x)g(y) \ud x \ud y
\end{IEEEeqnarray*}
```

$$\int\int f(x)g(y)\,\mathrm{d}x\,\mathrm{d}y$$
$$\iint f(x)g(y)\,\mathrm{d}x\,\mathrm{d}y$$
$$\iint f(x)g(y)\,\mathrm{d}x\,\mathrm{d}y$$

Math Symbols & Fonts

- Scott Pakin, *The Comprehensive LaTeX Symbol List*, 2009.
- T. Oetiker, *The Not So Short Introduction to LaTeX2ε*, 2011.