Definición de nuevos comandos

```
\newcommand{\nombre}{definición}
```

```
\newcommand{\tto}{\longrightarrow}
```

```
\newcommand{\N}{\ensuremath{\mathbb{N}}}
```

$f : A \longrightarrow B$

$\mathbb{N}$

Comandos con argumentos obligatorios

```
\newcommand{\nombre}[n]{definición}
```

$\frac{\partial f}{\partial x}$

```
\newcommand{\parcial}[2]{\frac{\partial#1}{\partial#2}}
```

$\frac{\partial f}{\partial x}$

$\frac{\partial z}{\partial x_i}$

```
\newcommand{\Norma}[1]{\Vert#1\Vert}
```

$\|u\|$

$\|u + v\|$

```
\newcommand{\upla}[2]{(#1_1,#1_2,$\ldots$,#1_{#2})}
```

$(a_1, a_2, \ldots, a_n)$

$(c_1, c_2, \ldots, c_m)$

```
\newcommand{\uplamatrix}[3]{
\begin{pmatrix}
#1_{11} &  #1_{12}  & \cdots  &  #1_{1 #3} \\
#1_{21} &  #1_{22} &  \cdots  & #1_{2 #3}  \\
\vdots     &  \vdots       & \vdots  & \vdots \\
#1_{#2 1} & #1_{#2 2} &  \cdots &  #1_{#2 #3}
\end{pmatrix}}
```

$$\begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{pmatrix}$$
$$\begin{pmatrix} c_{11} & c_{12} & \cdots & c_{1p} \\ c_{21} & c_{22} & \cdots & c_{2p} \\ \vdots & \vdots & \vdots & \vdots \\ c_{k1} & c_{k2} & \cdots & c_{kp} \end{pmatrix}$$

Comandos con argumentos opcionales

```
\newcommand{\nombre}[n][defecto]{definición}
```

```
\newcommand{\kupla}[3][k]{
(#2_{#3},$\ldots$ #2_{#1})
}
```

$(a_m, \ldots a_k)$
$(a_1, \ldots a_k)$
$(a_1, \ldots a_p)$
$(a_1, \ldots a_{10})$

Alineación y enumeración de fórmulas

$$f'(x) := \lim_{h \to 0} \frac{f(x+h) - f(x)}{x} \tag{1}$$

División de fórmulas con `multline`

$$\begin{multline} \frac{\partial f}{\partial u}(a,y) = \lim_{h \longrightarrow 0} \frac{f(x+ha, y+hb) - f(x,y)}{h} = \\ \lim_{h \longrightarrow 0} \frac{f(x,y) - f(x,y+bh)}{h} + \frac{f(x+ah,y) - f(x,y)}{h} \\ = a\frac{\partial f}{\partial x}(x,y) + b\frac{\partial f}{\partial y}(x,y) = \nabla f(x,y) \cdot (a,b) \tag{2} \end{multline}$$

$$\begin{multline*} \frac{\partial f}{\partial u}(a,y) = \lim_{h \longrightarrow 0} \frac{f(x+ha, y+hb) - f(x,y)}{h} = \\ \lim_{h \longrightarrow 0} \frac{f(x,y) - f(x,y+bh)}{h} + \frac{f(x+ah,y) - f(x,y)}{h} \\ = a\frac{\partial f}{\partial x}(x,y) + b\frac{\partial f}{\partial y}(x,y) = \nabla f(x,y) \cdot (a,b) \end{multline*}$$

Alineación con `gather`

$$A\cup B:=\{x\mid x\in A \text{ o } x\in B\} \tag{3}$$
$$A\cap B:=\{x\mid x\in A \text{ y } x\in B\} \tag{4}$$
$$A\setminus B:=\{x\mid x\in A \text{ y } x\notin B\} \tag{5}$$
$$A^{c}:=\{x\mid x\notin A\} \tag{6}$$
$$A\bigtriangleup B:=A\setminus B\cup B\setminus A \tag{7}$$

$$\begin{gathered}
A\cup B:=\{x\mid x\in A \text{ o } x\in B\}\\
A\cap B:=\{x\mid x\in A \text{ y } x\in B\}\\
A\setminus B:=\{x\mid x\in A \text{ y } x\notin B\}\\
A^{c}:=\{x\mid x\notin A\}\\
A\bigtriangleup B:=A\setminus B\cup B\setminus A
\end{gathered}$$

$$\begin{gathered}
A\cup B:=\{x\mid x\in A \text{ o } x\in B\} \quad (8)\\
A\cap B:=\{x\mid x\in A \text{ y } x\in B\} \quad (9)\\
A\setminus B:=\{x\mid x\in A \text{ y } x\notin B\}\\
A^{c}:=\{x\mid x\notin A\}\\
A\bigtriangleup B:=A\setminus B\cup B\setminus A
\end{gathered}$$

Alineación con `align`

```
\begin{align}

A\cup B:=&\{x\mid x\in A \text{ o } x\in B\}\\

A\cap B:=&\{x\mid x\in A \text{ y } x\in B\} \\

A\setminus B:=&\{x\mid x\in A \text{ y } x\notin B\}\\

A^{c}:=&\{x\mid x\notin A \} \\

A\bigtriangleup  B:=&A\setminus B\cup B\setminus A
```

\end{align}

$$A \cup B := \{x \mid x \in A \text{ o } x \in B\} \tag{10}$$
$$A \cap B := \{x \mid x \in A \text{ y } x \in B\} \tag{11}$$
$$A \setminus B := \{x \mid x \in A \text{ y } x \notin B\} \tag{12}$$
$$A^c := \{x \mid x \notin A\} \tag{13}$$
$$A \bigtriangleup B := A \setminus B \cup B \setminus A \tag{14}$$

$$\begin{aligned}
\|u+v\|^2 &= (u+v)\cdot(u+v) \\
&= u\cdot u + u\cdot v + v\cdot u + v\cdot v \\
&= \|u\|^2 + 2u\cdot v + \|v\|^2 \\
&\leq \|u\|^2 + 2\|u\|\|v\| + \|v\|^2 \\
&= (\|u\| + \|v\|)^2
\end{aligned}$$

$$\begin{aligned}
x &= ax+b & X &= uX+v & A &= aA+B \\
x' &= ax'+b & X' &= uX'+v & A' &= aA'+B' \\
y &= (1-a)y & Y &= (1-u)Y & B &= (1-a)B \\
y' &= (1-b)y' & Y' &= (1-v)Y' & B' &= (1-b)B'
\end{aligned}$$

$$\begin{aligned}
a' &= a' * e && \text{(Por la ley modulativa)} \\
&= a' * (a * a^{-1}) && \text{(Por la ley cancelativa)} \\
&= (a' * a) * a^{-1} && \text{(Por la ley asociativa)} \\
&= e * a^{-1} && \text{(Por la ley cancelativa)} \\
&= a^{-1}
\end{aligned}$$

Puesto que la igualdad

$$(fg)' = f'g + fg'$$

se puede escribir como

$$fg' = (fg)' - f'g$$

se concluye

$$\int fg' = \int (fg)' - \int f'g$$

Alineación con `split`

$$\begin{split}
A \cup B &:= \{x \mid x \in A \text{ o } x \in B\}\\
A \cap B &:= \{x \mid x \in A \text{ y } x \in B\}\\
A \setminus B &:= \{x \mid x \in A \text{ y } x \notin B\}\\
A^c &:= \{x \mid x \notin A\}\\
A \bigtriangleup B &:= A \setminus B \cup B \setminus A
\end{split}$$

$$\begin{split}
&\frac{f(a+h)-f(a)}{h} - \frac{\partial f}{\partial x}(a) =\\
&\qquad \frac{u(a+h)-u(a)-d_a u(h)}{h} + i\frac{v(a+h)-v(a)-d_a v(h)}{h}
\end{split}$$