First document

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Using linebreaks:
This is how you break a line without starting a new paragraph.

Empty lines between two blocks of text make the second block into a new paragraph.

And this is how blank space is inserted.

And this is how blank space is inserted while starting a new paragraph.

Packages mathtools and amsmath are needed for matricies and such.

The dollar sign is used for inline math equations. The escape character \followed by [starts it's own block of math and it is ended by \] This way math is written.

Subscripts in math mode are written as a_b and superscripts are written as a^b. These can be combined an nested to write expressions such as

$$T^{i_1 i_2 \dots i_p}_{j_1 j_2 \dots j_q} = T(x^{i_1}, \dots, x^{i_p}, e_{j_1}, \dots, e_{j_q})$$

We write integrals using $\int$ and fractions using $\frac{a}{b}$. Limits are placed on integrals using superscripts and subscripts:

$$\int_0^1 \frac{dx}{e^x} = \frac{e-1}{e}$$

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Lower case Greek letters are written as ω δ etc. while upper case Greek letters are written as Ω Δ.

Mathematical operators are prefixed with a backslash as $\sin(\beta)$, $\cos(\alpha)$, $\log(x)$ etc.

Splitting a line:

$$\begin{aligned} F = \{F_x \in F_c : (|S| > |C|) \\ \cap (\text{minPixels} < |S| < \text{maxPixels}) \\ \cap (|S_{\text{conected}}| > |S| - \epsilon)\} \end{aligned} \tag{1}$$

Vectors and matices:
$\vec{AB} = 0_E$
$\overrightarrow{AB} = 0_E$

$$|\vec{a}|$$

$$\vec{p} \times \vec{q} = |\vec{p}|\vec{q}|sin\theta\hat{n}$$

$$\vec{p} \cdot \vec{q} = |\vec{p}|\vec{q}|cos\theta$$

And vectors are simply written as one-column matices.

$$\begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_m \end{bmatrix}$$

$$\begin{matrix} 1 & 2 & 3 \\ a & b & c \end{matrix}$$

$$\begin{pmatrix} 1 & 2 & 3 \\ a & b & c \end{pmatrix}$$

$$\begin{bmatrix} 1 & 2 & 3 \\ a & b & c \end{bmatrix}$$

$$\begin{vmatrix} 1 & 2 & 3 \\ a & b & c \end{vmatrix}$$

$$\left\| \begin{matrix} 1 & 2 & 3 \\ a & b & c \end{matrix} \right\|$$

$$y = \begin{bmatrix} x_1 & x_2 & \cdots & x_N \end{bmatrix} \left(\begin{bmatrix} ax_0 + bx_1 \\ ax_1 + bx_2 \\ \vdots \\ x_{N-1} + x_N \end{bmatrix} - \begin{bmatrix} z_1 \\ z_2 \\ \vdots \\ z_N \end{bmatrix} \right) \tag{2}$$

Here i have to use "aligned". On the internet they say "align" is used. I don't know, but the error said to use aligned and it works now.

$$y = (x_1, x_2, \cdots, x_N) \left(\begin{bmatrix} ax_0 + bx_1 \\ \vdots \\ ax_{n-1} + bx_n \end{bmatrix} - \begin{bmatrix} z_1 \\ \vdots \\ z_n \end{bmatrix} \right)$$