1   Laboratory 2

Hey World! This is the first document.
This is a simple document[1].
This is a new paragraph.

2   Laboratory 3

2.1   Math mode

A sentence with inline mathematics: $y = mx + c$
A second sentence with inline mathematics: $5^2 = 3^2 + 4^2$
A second paragraph containing display math.

$$y = mx + c$$

See how the paragraph continues after the display.

2.1.1   Inline math mode and mathematical notation

Superscripts a^b and subscripts a_b
Some mathematics: $y = 2\sin\theta^2$

2.1.2   Display mathematics

A paragraph about a larger equation

$$\int_{-\infty}^{+\infty} e^{-x^2}\, dx$$

A paragraph about a larger equation

$$\int_{-\infty}^{+\infty} e^{-x^2}\, dx$$

A paragraph about a larger equation

$$\int_{-\infty}^{+\infty} e^{-x^2}\, dx \tag{1}$$

2.2   The amsmath package

Solve the following recurrence for $n, k \geq 0$:

$$Q_{n,0} = 1 \quad Q_{0,k} = [k = 0];$$
$$Q_{n,k} = Q_{n-1,k} + Q_{n-1,k-1} + \binom{n}{k}, \quad \text{for } n,\, k > 0.$$

AMS matrices.

$$\begin{matrix} a & b & c \\ d & e & f \end{matrix} \quad \begin{pmatrix} a & b & c \\ d & e & f \end{pmatrix} \quad \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix}$$

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[1] with a footnote

2.3 Fonts in math mode

bad use $size \neq size \neq$ size $bad\ use\ size \neq size \neq$ size

2.4 Further amsmath alignments

Gather

$$P(x) = ax^5 + bx^4 + cx^3 + dx^2 + ex + f \tag{2}$$
$$x^2 + 1 = 10 \tag{3}$$

Multline

$$(a + b + c + d)x^5 + (b + c + d + e)x^4$$
$$+ (c + d + e + f)x^3 + (d + e + f + a)x^2 + (e + d + f + a + b)x$$
$$+ (f + a + b + c)$$

2.4.1 Columns in math alignments

Aligned equations

$$
\begin{aligned}
a &= b + 1 & c &= d + 3 & e &= f + 3 \\
r &= s^2 & t &= u^3 & v &= w^4
\end{aligned}
$$

- $a = b$
  $c = d$

- $a = b$
  $c = d$

2.5 Bold Math

$(x + y)(x - y) = x^2 - y^2$
$\boldsymbol{(x + y)(x - y) = x^2 - y^2}\ \boldsymbol{\pi r^2}$
$(x + \mathbf{y})(x - \mathbf{y}) = x^2 - \mathbf{y}^2$
πr^2
$(x + \mathbf{y})(x - \mathbf{y}) = x^2 - \mathbf{y}^2$
$(x + \boldsymbol{y})(x - \boldsymbol{y}) = x^2 - \boldsymbol{y}^2$
$\alpha + \boldsymbol{\alpha} < \beta + \boldsymbol{\beta}$

2.6 Mathtools

$$
\begin{pmatrix}
10 & 11 \\
3 & 4 \\
-7 & -8
\end{pmatrix}
$$

One two Three

$$\log \alpha + \log \beta = \log(\alpha\beta)$$

2.7 Mathematical alphabets

$$A + \mathfrak{A} + \mathbf{A} + \mathscr{A} + \mathbb{A}$$