Notes Template

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Spring 2024

Contents

Chapter 1

Sample Chapter

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1.1 Sample Equations

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1.1.1 Greek Letters

$$\alpha, \beta, \gamma, \Gamma, \pi, \Pi, \phi, \varphi, \mu, \Phi, \xi, \zeta$$

$$\cos(2\theta\phi) = \cos^2\theta\phi - \sin^2\theta\phi$$

1.1.2 Delimiters

There are many types of delimiters one can use:

$$(a), [b], \{c\}, |d|, \|e\|, \langle f\rangle, \lfloor g\rfloor, \lceil h\rceil, \ulcorner i\urcorner$$

See how the delimiters are of reasonable size in these examples

$$(a+b)\left[1-\frac{b}{a+b}\right]=a\,,$$

$$\sqrt{|xy|}\le\left|\frac{x+y}{2}\right|,$$

even when there is no matching delimiter

$$\int_a^b u\frac{d^2v}{dx^2}\,dx=u\frac{dv}{dx}\bigg|_a^b-\int_a^b\frac{du}{dx}\frac{dv}{dx}\,dx.$$

whereas vector problems often lead to statements such as

$$u=\frac{-y}{x^2+y^2}\,,\quad v=\frac{x}{x^2+y^2}\,,\quad\text{and}\quad w=0\,.$$

1.1.3 Multiple Fractions

Typesetting continued fractions is easy:

$$x=a_0+\cfrac{1}{a_1+\cfrac{1}{a_2+\cfrac{1}{a_3+a_4}}}$$

However, as the fractions continue, they get smaller. If you want to keep the size consistent, use the display style; e.g.

$$x=a_0+\cfrac{1}{a_1+\cfrac{1}{a_2+\cfrac{1}{a_3+a_4}}}$$

1.1.4 Arrays

Arrays of mathematics are typeset using one of the matrix environments as in

$$\begin{bmatrix}1&x&0\\0&1&-1\end{bmatrix}\begin{bmatrix}1\\y\\1\end{bmatrix}=\begin{bmatrix}1+xy\\y-1\end{bmatrix}.$$

$$\begin{pmatrix}2&3&4\\5&6&7\\8&9&10\end{pmatrix}v=0$$

Case statements use cases:

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

Many arrays have lots of dots all over the place as in

$$\begin{matrix} -2 & 1 & 0 & 0 & \cdots & 0 \\ 1 & -2 & 1 & 0 & \cdots & 0 \\ 0 & 1 & -2 & 1 & \cdots & 0 \\ 0 & 0 & 1 & -2 & \ddots & \vdots \\ \vdots & \vdots & \vdots & \ddots & \ddots & 1 \\ 0 & 0 & 0 & \cdots & 1 & -2 \end{matrix}$$

1.1.5 Accents

Mathematical accents are performed by a short command with one argument, such as

$$\tilde{f}(\omega) = \frac{1}{2\pi} \int_{-\infty}^{\infty} f(x) e^{-i\omega x}\, dx\,,$$

or

$$\dot{\vec{\omega}} = \vec{r} \times \vec{I}.$$

1.1.6 Multiline equations and aligned environments

New lines (
) do not work in equation environments. To achieve alignment of equations, use the aligned package to produce multiline aligned math, such as:

$$\begin{aligned} F = \{F_x \in F_c : (|S| > |C|) & \quad (1.1) \\ \cap\, (\text{minPixels} < |S| < \text{maxPixels}) & \quad (1.2) \\ \cap\, (|S_{\text{conected}}| > |S| - \varepsilon)\} & \quad (1.3) \end{aligned}$$

and also:

$$\begin{aligned} A_0 = \frac{1}{(\alpha + t_x)^{r+s+x}} {}_2F_1\left(r+s+x, x+1; r+s+x+1; \frac{\alpha-\beta}{\alpha+t_x}\right) & \quad (1.4) \\ - \frac{1}{(\alpha + T)^{r+s+x}} {}_2F_1\left(r+s+x, x+1; r+s+x+1; \frac{\alpha-\beta}{\alpha+T}\right), & \quad (1.5) \end{aligned}$$

Theorem 1. For any nonnegative integer n, we have $(1+x)^n = \sum_{i=0}^{n} \binom{n}{i} x^i$

Appendices

Appendix A

My Appendix

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A.1 My figures

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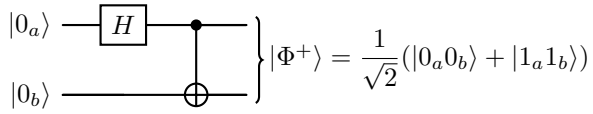

Figure A.1: Example of Tikz figure [1].

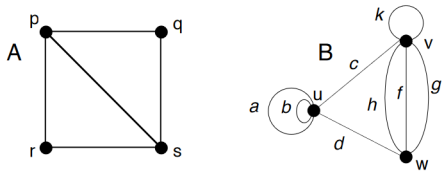

Figure A.2: Example of figure.

vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Bibliography

[1] M. A. Nielsen and I. L. Chuang, *Quantum Computation and Quantum Information: 10th Anniversary Edition*. Cambridge University Press, 2011.