Chirun: A Reference Guide for Users

Ross Parker

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1 Introduction

This documents acts as a template and reference guide for using the LaTeX to HTML conversion tool Chirun (Chirun Project 2025*a*). This document is built from a `tex` file, and converted to HTML. Chirun also supports the conversion of markdown `md` files to HTML.

When uploading existing LaTeX notes for the first time, there's a good chance Chirun will fail to convert them to HTML and you'll see a long console log containing various errors. This can be very frustrating and you may be tempted to give up, and stick with using PDF documents. Bear with it though, as the benefits of using Chirun are worth it.

Using Chirun, you can create HTML documents that are accessible to screen readers and other assistive technologies, and you can also embed videos and images in your documents. This is a great way to make your notes more engaging and interactive for your students.

If you use this document to better understand which LaTeX packages Chirun supports (Chirun Project 2025*b*), and how best to format your LaTeX documents, you can create accessible LaTeX HTML documents (World Wide Web Consortium (W3C) 2023).

While HTML is the gold standard for accessibility, Chirun also generates a PDF version of your notes that can be particularly useful for students who like to annotate their notes. Try clicking the **Download as PDF** link above the Table of Contents.

Figure 1: A spiral formed by Fibonacci-numbered squares resembles a snail shell—an elegant pattern often used in art and design. Photo by Krzysztof Niewolnyn on Unsplash

2 Including Images

The insertion of images makes use of the `\chirun` package, by allowing alternative text to be inserted using the `\alttext` command. If you use assisitive technologies such as a screenreader, this image will be read out as follows: **'A snail with a yellow and brown spiral patterned shell on the top of a red mushroom.'** Without the `\alttext` command, the screenreader would read out the file name of the image instead, which is not very helpful and will unfairly disadvantage anyone with a visual impairment.

3 Quotations

You can make quotations stand out by using the `\quote` or `\quotation` command. If you want to add coloured boxes for things like derivatives or theorems, see the section on using coloured boxes.

> *"The Fibonacci Sequence turns out to be the key to understanding how nature designs... and is... a part of the same ubiquitous music of the spheres that builds harmony into atoms, molecules, crystals, shells, suns and galaxies and makes the Universe sing."*
>
> **Guy Murchie**

4 Making Lists

Here are examples of creating lists. The first is an ordered list using `{enumerate}` and the second is an unordered list using `{itemize}`.

4.1 Ordered Lists

This photography workflow outlines the key steps a photographer follows, from capturing an image to producing the final output. Each stage builds upon the previous one, demonstrating a clear, sequential process.

1. **Shoot** – Capture the image using the best settings for your scene and creative intent.
2. **Transfer** – Move the photos from your camera to your computer or cloud storage for backup.
3. **Edit** – Adjust exposure, color balance, cropping, and apply creative edits to enhance the image.
4. **Publish** – Share the edited image online, whether on social media, websites, or portfolios.
5. **Print** – Create physical copies for display, framing, or professional use.

4.2 Unordered Lists

Capturing light for image rendition requires a basic understanding of the fundamentals of the exposure triangle, which is composed of three parameters:

- **Aperture** – Controls the size of the lens opening, affecting depth of field.
- **Shutter Speed** – Determines how long light is exposed to the sensor, influencing motion blur.
- **ISO** – Adjusts sensor sensitivity to light, balancing exposure and noise levels.

5 Maths Equations

When converting LaTeX documents to HTML, mathematical notation is often rendered using **MathJax**. This ensures that equations are displayed clearly

in web browsers and remain accessible to screen readers and other assistive technologies.

5.1 The Fibonacci Sequence

The Fibonacci sequence (of Pisa 1202) is a famous number pattern where each number is the sum of the two before it. It begins like this:

$$0,\ 1,\ 1,\ 2,\ 3,\ 5,\ 8,\ 13,\ 21,\ 34,\ \ldots$$

5.2 Recursive Definition

The Fibonacci sequence can be defined using a simple recursive formula:

$$F_0 = 0, \quad F_1 = 1, \quad F_n = F_{n-1} + F_{n-2} \quad \text{for } n \geq 2 \tag{1}$$

5.3 Closed-form Formula (Binet's Formula)

We can also calculate the nth Fibonacci number directly using a closed-form formula, though it's a bit more complex:

$$F_n = \frac{1}{\sqrt{5}} \left(\phi^n - \left(-\frac{1}{\phi} \right)^n \right) \tag{2}$$

where ϕ (phi) is the golden ratio:

$$\phi = \frac{1 + \sqrt{5}}{2} \tag{3}$$

5.4 The Golden Ratio

As the sequence continues, the ratio between consecutive Fibonacci numbers approaches the golden ratio:

$$\lim_{n \to \infty} \frac{F_{n+1}}{F_n} = \phi \approx 1.618 \tag{4}$$

This ratio appears in many areas of nature, design, and photography.

5.5 Matrix Representation

Fibonacci numbers can even be represented using matrices, which is useful for advanced calculations:

$$\begin{bmatrix} F_{n+1} \\ F_n \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}^n \begin{bmatrix} 1 \\ 0 \end{bmatrix} \tag{5}$$

This shows that the Fibonacci sequence has many layers, from simple patterns to deeper mathematical structures.

6 Using Tables

Tables can be useful for presenting sets of related data at a glance. In photography, the exposure triangle is often represented through typical values for aperture, shutter speed, and ISO (Mansurov 2024).

Aperture (f-stop)	**Shutter Speed**	**ISO**
f/1.4	1/1000 sec	100
f/2.8	1/500 sec	200
f/4	1/250 sec	400
f/5.6	1/125 sec	800
f/8	1/60 sec	1600
f/11	1/30 sec	3200
f/16	1/15 sec	6400

Table 1: Typical Exposure Triangle Settings

Note: The values in each row are illustrative and may not correspond to correct exposure in real-life scenarios. The appropriate settings depend on the amount of available light. For example, choosing f/4 and ISO 400 may require a different shutter speed than 1/250th second to achieve proper exposure.

7 Coloured Boxes

Shaded boxes are supported using the `tcolorbox` package. The colours are applied using the `[dvipsnames]` option within the `xcolor` package.

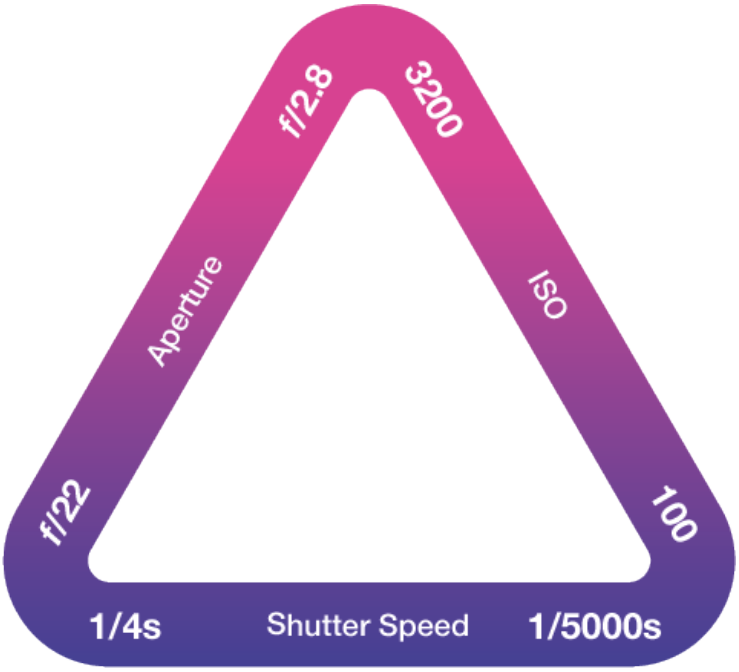


Figure 2: An illustration of the exposure triangle, showing the relationship between aperture, shutter speed, and ISO.

7.1 A Theorem in a Blue Box

Let f be a continuous function on a closed interval $[a, b]$. Then f is bounded on $[a, b]$, and there exist points $c, d \in [a, b]$ such that:

$$f(c) \leq f(x) \leq f(d) \quad \text{for all } x \in [a, b].$$

7.2 An Example in a Yellow Box with a Heading Section

Example

Consider the function $f(x) = \sin x$ on the interval $[0, \pi]$. Since sine is continuous on this interval, it is bounded. In fact,

$$\min_{x \in [0,\pi]} \sin x = 0 \quad \text{and} \quad \max_{x \in [0,\pi]} \sin x = 1.$$

8 Code Highlighting Using the Listings Package

Code can be highlighted using the `listings` package. The following example shows how to create a function that computes the incidence matrix of two generators. The function `incmatrix` takes two lists of generators as input and returns the incidence matrix. The code is written in Python and uses NumPy for matrix operations.

```
import numpy as np

def incmatrix(genl1,genl2):
    m = len(genl1)
    n = len(genl2)
    M = None #to become the incidence matrix
    VT = np.zeros((n*m,1), int)  #dummy variable

    #compute the bitwise xor matrix
    M1 = bitxormatrix(genl1)
    M2 = np.triu(bitxormatrix(genl2),1)

    for i in range(m-1):
        for j in range(i+1, m):
            [r,c] = np.where(M2 == M1[i,j])
            for k in range(len(r)):
                VT[(i)*n + r[k]] = 1;
                VT[(i)*n + c[k]] = 1;
                VT[(j)*n + r[k]] = 1;
```

```
                VT[(j)*n + c[k]] = 1;

                if M is None:
                    M = np.copy(VT)
                else:
                    M = np.concatenate((M, VT), 1)

                VT = np.zeros((n*m,1), int)

    return M
```

Listing 1: Python example

9 Including Videos

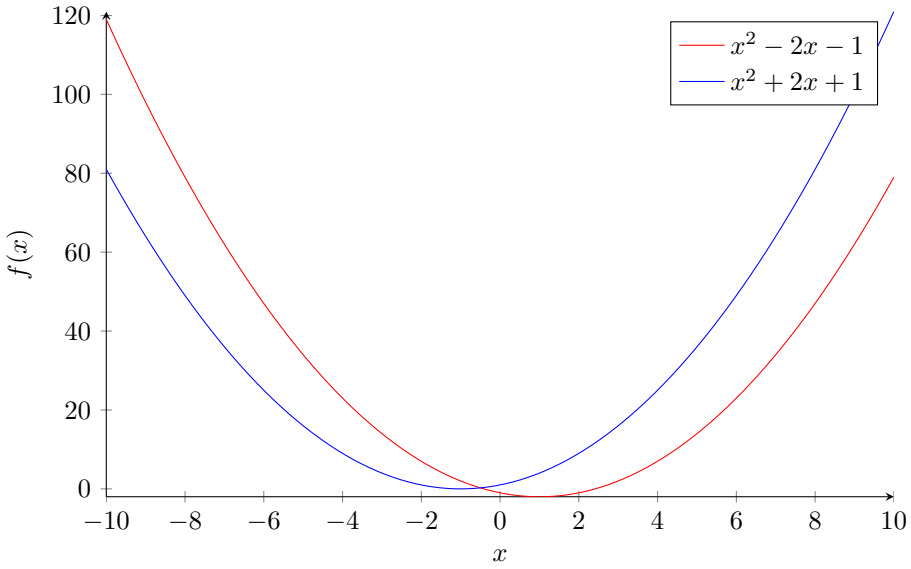
Videos can be embedded from YouTube or Vimeo so they appear in the HTML output. They are rendered as hyperlinks in the PDF output. For more information visit the Chirun LaTeX package documentation (Graham 2022). **Video**

YouTube:

https://www.youtube.com/embed/BAIAlWS3FRE

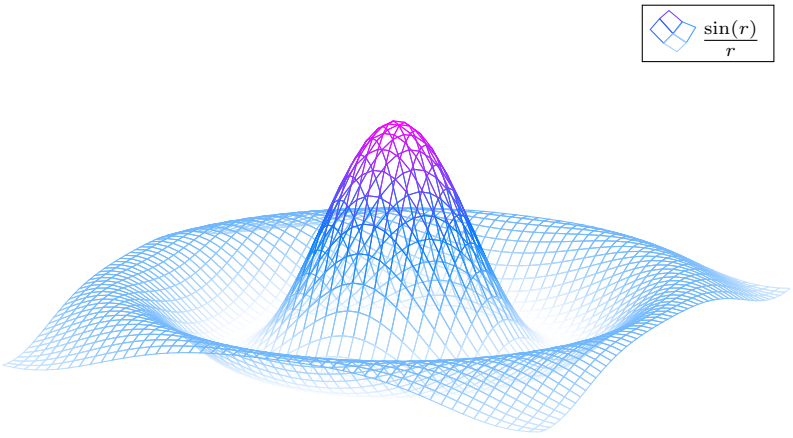
10 Scientific Charts and Diagrams

10.1 Plotting Mathematical Expressions Using a Line Graph



10.2 Plotting Mathematical Expressions Using the Mesh Parameter

Example using the mesh parameter



References

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Chirun Project (2025*b*), *Chirun Tutorial*, Chirun Project. https://chirun.org.uk/docs/en/latest/getting_started/tutorial.html.

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Mansurov, N. (2024), 'Understanding iso, shutter speed and aperture – a beginner's guide'. Accessed: 2025-05-12.
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