# A First Ximera Xourse

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# Contents

# Part I

# The First Topic of This Course

## 1 A basic worksheet

*A simple Ximera activity.*

I MADE A CHANGE

Here's another

Perhaps the most natural setting for Ximera content is that of a *worksheet*. This is some document that may contain discussion as well as questions that check understanding.

Ximera comes pre-equipped with many environments. If you are ever curious about the source code, you can visit this source at

`https://github.com/ximeraProject/ximeraFirstOverleafSteps`

or by appending `.tex` to the URL of this page online.

### 1 A basic use case

We use `\begin{definition}` for definitions and `\begin{question}` for questions. Since Ximera provides immediate feedback, we suggest following definitions like this one by a quick question. Here's an example:

**Definition 1.** The **absolute value** of a real number $a$, denoted by $|a|$, is

$$|a| = \begin{cases} a & \text{if } a \geq 0 \\ -a & \text{if } a < 0. \end{cases}$$

Now students can check their understanding:

**Question 1** *Evaluate the following:*

(a) $|2-5| = 3$

(b) $|5-2| = 3$

(c) $|5-\sqrt{2}| = 5-\sqrt{2}$

(d) $|5-\sqrt{2}| = 3.58578643763$

*If $x > 3$ then:*

(a) $|x - 3| = x - 3$

(b) $|3 - x| = x - 3$

(c) $|\sin(x) - 3| = 3 - \sin(x)$

To see why there are two versions of the $|5 - \sqrt{2}|$ question, view the source code for this question by appending `.tex` to the end of the URL.

## 2 A paradox

Here's something fun

**Paradox 1** $(0 = 1)$**.** Let $x = y$ and write

$$x^2 = xy \tag{1}$$
$$x^2 - y^2 = xy - y^2 \tag{2}$$
$$(x - y)(x + y) = (x - y)y \tag{3}$$
$$(x + y) = y \tag{4}$$
$$2y = y \tag{5}$$
$$2 = 1. \tag{6}$$

Where is the mistake in the work above?

Between line 3 and line 4.

## 3 Basic exercises

After that, you might want to have some exercises. You will not find any inspiration in the above definition of the absolute value.

**Exercise 2** *Let $x$ be the number of people out of 100 that LOVE Ximera.*

*Find the value of $x$.*

$$x = 100$$

Maybe you want a problem with one or more parts,

**Exercise 3** *Ximera is so awesome because it feels like:*

***Multiple Choice:***

(a) *Doing taxes*

(b) *Writing a book by hand*

(c) *A walk in the park with free ice cream* ✓

(d) *Solving a puzzle blindfolded*

**Exercise 3.1** *Why is Ximera the best thing since the chalkboard?*

***Select All Correct Answers:***

(a) *It turns LaTeX into online materials* ✓

(b) *It boosts student engagement* ✓

(c) *It makes coffee and hugs you*

(d) *It's open-source and free* ✓

Finally we can include pictures using `includegraphics`. Here's an example of a question with a picture.

**Question 4** *Here is a picture of the Ximera Octolion:*


*What's their name?*

*Name* = *Xarlie*

***Hint:*** *Their name begins with an "X."*

***Hint:*** *It ends with an "arlie."*

***Hint:*** *It's almost Karlie!*

We include JPGs and PDFs in exactly the same way.

# 2 And now for some exercises

*Let's practice*

**Exercise 5** *Ximera is so awesome because it feels like (. . . doing taxes / . . . writing a book by hand / . . . a walk with free ice cream ✓/ . . . solving a puzzle blindfolded)*

**Exercise 6** *Out of* 100 *random people you show Ximera, exactly* 100 *will immediately LOVE it.*

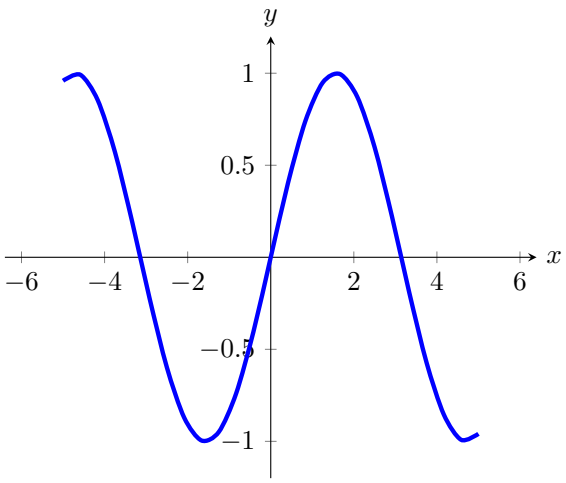
***Hint:*** *Don't underestimate the power of LOVE in people. Nor the power of Ximera.*

# 3 Graphics, videos, and interactives

*How to include graphics and other interactive content.*

## 1 Including images

In the last section, we showed you how to include images using `includegraphics`. However, **the preferred method to include graphics is with TikZ.**




We can create the image above with the following code:

```
\begin{image}
  \begin{tikzpicture}
    \begin{axis}[
        xmin=-6.4,
        xmax=6.4,
        ymin=-1.2,
        ymax=1.2,
        axis lines=center,
        xlabel=$x$,
        ylabel=$y$,
        every axis y label/.style={at=(current axis.above origin),anchor=south},
        every axis x label/.style={at=(current axis.right of origin),anchor=west},
      ]
      \addplot [ultra thick, blue, smooth] {sin(deg(x))};
    \end{axis}
```

```
  \end{tikzpicture}
\end{image}
```

## 2 Videos

We can embed YouTube Videos with the `\youtube` command, for example, `\youtube{FvgF95i0_lw}` would embed the video into the page, like this:

YouTube link: https://www.youtube.com/watch?v=FvgF95i0_lw

## 3 The graph command

The easiest way to include an interactive graph is to use the `\graph` command. Unfortunately, the `\graph` command doesn't draw a graph in the PDF, rather, it states (in words) that a graph is produced.

Graph of $x^2$

There are a number of options for the `\graph` command, and you can find out more WHERE? Here are two examples. One with axis labels and a set window:

Graph of $y = x^3$

and another, piecewise function:

Graph of $\sin(x)\left\{x < 0\right\}, 2x\left\{x >= 0\right\}$

## 4 Desmos, Desmos3D, and Geogebra

If you require further features from Desmos[1], you can sign up for an account and include your worksheets like this:

```
\begin{center}
\desmos{zwywds7med}{800}{600}
\end{center}
```

Desmos link: https://www.desmos.com/calculator/zwywds7med

Desmos3D[2] and GeoGebra[3] work in similar ways, with:

[1] See Desmos at https://www.desmos.com/
[2] See Desmos3D at https://www.desmos3d.com
[3] See GeoGebra at https://www.geogebra.org/

Desmos3D link: https://www.desmos.com/3d/bb4exrhrl3

generated by

```
\begin{center}
\desmosThreeD{bb4exrhrl3}{800}{600}
\end{center}
```

and

GeoGebra link: https://www.geogebra.org/m/XC3FXUdJ

generated by:

```
\begin{center}
\geogebra{XC3FXUdJ}{800}{600}
\end{center}
```

And remember the definition of the absolute value.