



# Geometric Maps in Higher Topos Theory

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Topological Duality	
Open	Closed
Universally Open	Universally Closed
Unramified	Separated
Étale	Proper

## 1. Introduction

## 2. Unicode

Here is a list of the unicode characters I will use:

Symbol	Unicode	VSCode shortcut	Use
Lean's Kernel			
$\times$	2A2F	<code>\times</code>	Product of types
$\rightarrow$	2192	<code>\rightarrow</code>	Hom of types
$\langle, \rangle$	27E8, 27E9	<code>\langle, \rangle</code>	Product term introduction
$\mapsto$	21A6	<code>\mapsto</code>	Hom term introduction
$\wedge$	2227	<code>\wedge</code>	Conjunction
$\vee$	2228	<code>\vee</code>	Disjunction
$\forall$	2200	<code>\forall</code>	Universal quantification
$\exists$	2203	<code>\exists</code>	Existential quantification
$\neg$	00AC	<code>\neg</code>	Negation
Variables and Constants			
$a, b, c, \dots, z$	1D52, 1D56		Variables and constants
$0, 1, 2, 3, 4, 5, 6, 7, 8, 9$	1D52, 1D56		Variables and constants
$-$	207B		Variables and constants
$0.1.2.3.4.5.6.7.8.9$	2080 - 2089	<code>\0-\9</code>	Variables and constants
$\mathbb{A}, \dots, \mathbb{Z}$	1D538	<code>\bba, ..., \bbz</code>	Variables and constants
$\mathfrak{a}, \dots, \mathfrak{z}$	1D552	<code>\bba, ..., \bbz</code>	Variables and constants
$\alpha, \omega, \mathbb{A}, \Omega$	03B1-03C9		Variables and constants
Categories and Bicatgories			
$1$	1D7D9	<code>\b1</code>	The identity morphism
$\circ$	2218		Composition
			Composition
			Composition
Adjunctions			
$\cdot$	1BC94		Right adjoints
$\cdot$	0971		Left adjoints
$\dashv$	22A3	<code>\dashv</code>	The condition that two functors are adjoint
Monads and Comonads			
$?, \mathfrak{c}$	003F, 00BF	<code>?, \mathfrak{c}</code>	The corresponding (co)monad of an adjunction
$!, \mathfrak{i}$	0021, 00A1	<code>!, \mathfrak{i}</code>	The (co)-Eilenberg-(co)-Moore adjunction
$\mathfrak{i}, \mathfrak{c}$	A71D, A71E		The (co)AdjMon maps
Miscellaneous			
$\simeq$	2243	<code>\equiv</code>	Equivalences
$\cong$	2245	<code>\cong</code>	Isomorphisms
$\perp$	22A5	<code>\bot</code>	The overobject classifier
$\infty$	221E	<code>\infty</code>	Infinity categories and infinity groupoids

Of these, the characters  $\mathfrak{i}$ ,  $\mathfrak{c}$ , and  $\mathfrak{c}$  do not have VSCode shortcuts, and so I provide alternatives for them. Possibly they will have to be changed if this work assimilates into a larger project.

It is not possible to copy the from the pdf to the clipboard while preserving the integrity of the code. To see the official Lean 4 file please click the link on the top right of the front page or this.

## Lean 1

```
import Mathlib.CategoryTheory.Bicategory.Basic
import Mathlib.CategoryTheory.Types
import Mathlib.CategoryTheory.DiscreteCategory
import Mathlib.Combinatorics.Quiver.Basic
import Mathlib.CategoryTheory.Category.Init
import Aesop
import Init
import Mathlib.CategoryTheory.DiscreteCategory
import Mathlib.CategoryTheory.Bicategory.Strict
import Mathlib.CategoryTheory.ConcreteCategory.Bundled
import Mathlib.CategoryTheory.Functor.Basic
import Init.Core
import Mathlib.CategoryTheory.Category.Cat

import TheWhiteheadTheorem

-- #check
-- #
```



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