

Notes on Alain Badiou's

"Mathematics of The Transcendental - Onto-Logy and Being-There" (2014):

<https://www.bloomsbury.com/us/mathematics-of-the-transcendental-9781441189240/>

These notes are at:

<http://angg.twu.net/LATEX/2020badiou-mt.pdf>

### 3. The size of a category

(Page 25: cone)

$$\begin{array}{ccc}
 \begin{array}{c} c \\ g_1 \swarrow \quad \searrow g_2 \\ a_1 \xrightarrow{f} a_2 \end{array} & 
 \begin{array}{c} c \xrightarrow{\text{id}} c \\ g_1 \downarrow \quad \downarrow g_2 \\ a_1 \xrightarrow{f} a_2 \end{array} & 
 \begin{array}{c} (c \xrightarrow{\text{id}} c) \longleftrightarrow c \\ (g_1, g_2) \downarrow \\ (a_1 \xrightarrow{f} a_2) \end{array} \\
 f \circ g_1 = g_2
 \end{array}$$

### 5. Some fundamental concepts

(Page 30): Limit of the diagram with two objects without arrows:

$$\begin{array}{ccc}
 \begin{array}{c} c' \\ g_1 \swarrow \quad \searrow g_2 \\ a \leftarrow \underset{f_1}{\longleftarrow} c \xrightarrow{f_2} b \\ h \downarrow \end{array} & 
 \begin{array}{c} \forall c' \\ \forall g_1 \swarrow \quad \searrow \exists! h \\ a \leftarrow \underset{f_1}{\longleftarrow} c \xrightarrow{f_2} b \\ \exists! h \downarrow \end{array} & 
 \begin{array}{c} (c' \ c') \longleftrightarrow c' \\ \forall(g_1, g_2) \downarrow \\ (c \ c) \longleftrightarrow c \\ (h, h) \downarrow \\ (f_1, f_2) \downarrow \\ (a \ b) \end{array} \\
 \forall(g_1, g_2)
 \end{array}$$

(Page 33): Pullback

$$\begin{array}{ccc}
 \begin{array}{c} c' \\ \exists! k \swarrow \quad \searrow \forall i_1 \\ a_2 \leftarrow \underset{\forall i_2}{\longleftarrow} c \xrightarrow{h_1} a_1 \\ h_2 \downarrow \quad \downarrow f \\ b \end{array} & 
 \begin{array}{c} (c' \xrightarrow{\text{id}} c' \xleftarrow{\text{id}} c') \longleftrightarrow c' \\ \forall(i_1, \dots, i_2) \downarrow \\ (c \xrightarrow{\text{id}} c \xleftarrow{\text{id}} c) \longleftrightarrow c \\ (h, \_, \_, h) \downarrow \\ (f_1, \_, \_, f_2) \downarrow \\ (a_1 \xrightarrow{f} b \xleftarrow{g} a_2) \end{array} & 
 \end{array}$$

## 8. Exponentiation

(Page 48):

$$\begin{array}{ccccc} a & \xleftarrow{\text{pr}_a} & a \times c & \xrightarrow{\text{pr}_c} & c \\ f \downarrow & & & & \downarrow g \\ b & \xleftarrow{\text{pr}_b} & b \times d & \xrightarrow{\text{pr}_c} & d \end{array} \quad \begin{array}{ccccc} & & a \times c & & \\ & \swarrow f \circ \text{pr}_a & \downarrow f \times g & \searrow g \circ \text{pr}_c & \\ b & \xleftarrow{\text{pr}_b} & b \times d & \xrightarrow{\text{pr}_d} & d \end{array} \quad \langle f \circ \text{pr}_a, g \circ \text{pr}_c \rangle$$

(Page 49):