

**CAAP Math, Mr. Church, Homework 4**  
Due at the beginning of class on Wednesday, July 16  
<http://www.math.uchicago.edu/~tchurch/>

1. Read the first two sections of Chapter 2.1 (“Cancellation in Addition” and “Properties of  $-1$  and  $0$ ”, pages 70–75).
2. Exercise 1.29: The following equalities are true in ordinary arithmetic. Are they true in one’s digit arithmetic?
  - (a)  $-(-a) = a$
  - (b)  $\frac{1}{\frac{1}{a}} = a$ , provided  $\frac{1}{a}$  exists. (This can also be written as “ $(a^{-1})^{-1} = a$ , provided  $a^{-1}$  exists”.)
  - (c)  $\frac{-1}{a} = \frac{1}{-a} = -\frac{1}{a}$ , provided  $\frac{1}{a}$  exists. (This can also be written as “ $(-1) \cdot a^{-1} = (-a)^{-1} = -(a^{-1})$ , provided  $a^{-1}$  exists”.)
  - (d)  $(-a)(-b) = ab$
3. Exercise 1.30: Which numbers are perfect squares in one’s digit arithmetic? Which numbers are perfect cubes?
4. Exercise 1.31: Verify that for all the numbers in one’s digit arithmetic,  $x^5 = x$ .
5. Exercise 1.41: Given that the table on page 65 represents an operation satisfying Axioms A1–A4, complete as much of the table as possible.