

# Homework 4

Math 300, Fall 2022

This homework is due on Friday, September 16.

*You may cite results from class, as appropriate.*

1. (*This problem is not to be turned in.*) Read Section 2.1
2. Read Francis Su's *Guidelines for good mathematics writing*<sup>1</sup>.
  - (a) List one thing from this document that was surprising or interesting to you.
  - (b) Pick one proof from Section 2.1, 2.2, or 3.1 in your book, and analyze it with respect to Su's advice. Where do you see advice being followed (or not)?
3. Complete the following claim, and give a proof:  
*Let  $n$  be an integer. Then  $(n + 1)(n - 1) + 3$  is even, if and only if  $n$  is \_\_\_\_\_.*
4. Prove or disprove the following claims:
  - (a) For every integer  $a$ , the following holds:  
 $a^2|a$  if and only if  $a = 0$  or  $a = 1$  or  $a = -1$ .
  - (b) For all integers  $x$  and  $y$ , if  $3|x$  and  $5|y$ , then  $8|(x + y)$ .
  - (c)  $(\forall a \in \mathbb{Z})(\forall b \in \mathbb{Z})(3|a \Rightarrow 9|(ab))$
  - (d)  $(\exists x \in \mathbb{R})(\exists y \in \mathbb{Z}) x - y = -5$
  - (e)  $(\exists a \in \mathbb{Z})(\exists b \in \mathbb{Z}) a - b = 0.5$
5. Section 2.1 # 3, 4, 5, 12

---

## Writing Assignment 4

Math 300

This homework is due on Fri., Sept. 30 (so, you have **three** weeks to complete this). *Complete this part on a separate piece of paper, not the same paper for Homework.*

1. List the sources you plan to use for your term paper (websites, articles, reference books, etc.)
2. Write a paragraph describing what you expect to be the main message<sup>2</sup> of your paper.
3. List three key ideas<sup>3</sup> that you expect to develop in your paper.

---

<sup>1</sup>Available here: <https://math.hmc.edu/su/wp-content/uploads/sites/10/2020/08/Guidelines-for-Good-Mathematical-Writing.pdf>

<sup>2</sup>Here, you need to state the message – the main take-away for your reader – not the actual mathematical content of the paper.

<sup>3</sup>State each idea as a sentence (or paragraph).