HOMEWORK 4

MATH 2001

QI WANG

ABSTRACT. This is the first homework assignment. The problems are from Hammack [Ham18, Ch. 2]:

- **Chapter 2 Section 2.1**, Exercises: 2, 4, 6. **Section 2.2**, Exercises: 2, 6. **Section 2.3**, Exercises: 8, 10. **Section 2.4**, Exercises: 4.

CONTENTS

Date: February 7, 2020.

CHAPTER 2 SECTION 2.1

Ch.2, §2.1, Exercise 2. Decide whether or not the following are statements. In case of a statment, say if it is true or false, if possible: "Every even integer is a real number."

Solution to Ch.1, §2.1, Exercise 2.

It is a statement.

It is true.

□

Ch.2, §2.1, Exercise 4. Decide whether or not the following are statements. In case of a statment, say if it is true or false, if possible: "Set $\mathbb{Z}$ and set $\mathbb{N}$"

Solution to Ch.1, §1.1, Exercise 8.

It is not a statement.

□

Ch.2, §2.1, Exercise 6.

Solution to Ch.1, §2.1, Exercise 6.

It is a statement.

It is true.

□

Ch.2, §2.2, Exercise 2. Express each statement or open sentence in one of the forms $P \vee Q$, $P \wedge Q$, or $\neg P$. Be sure to also state what statements P and Q stand for: "The matrix A is not invertible."

Solution to Ch.2, §2.2, Exercise 2.

$$P : \text{The matrix A is invertible.}$$

$$\neg P$$

□

Ch.2, §2.2, Exercise 6. Express each statement or open sentence in one of the forms $P \vee Q$, $P \wedge Q$, or $\neg P$. Be sure to also state what statements P and Q stand for: "There is a quiz scheduled for Wednesday or Friday."

Solution to Ch.2, §2.2, Exercise 6.

$$P: \text{There is a quiz scheduled for Wednesday.}$$

$$Q: \text{There is a quiz scheduled for Friday.}$$

$$P \wedge Q$$

□

Ch.2, §2.3, Exercise 8. Without changing their meanings, convert each of the following sentences into sentence having the form " *If P, then Q* ": "A geometric series with ratio r converges if $|r| < 1$."S

Solution to Ch.2, §2.2, Exercise 8.

If $|r| < 1$, then the geometric series with ratio r converges.

□

Ch.2, §2.3, Exercise 8. Without changing their meanings, convert each of the following sentences into sentence having the form " *If P, then Q* ": "The discriminant is negative only if the quadratic equation has no real solutions."

Solution to Ch.2, §2.2, Exercise 8.

If the discriminant is negative, then the quadratic equation has no real solutions.

□

Ch.2, §2.3, Exercise 8. Without changing their meanings, convert each of the following sentences into sentence having the form " *P if and only if Q* ": "If $a \in \mathbb{Q}$ then $5a \in \mathbb{Q}$, and if $5a \in \mathbb{Q}$ then $a \in \mathbb{Q}$. "

Solution to Ch.2, §2.2, Exercise 8.

$a \in \mathbb{Q}$ if and only if $5a \in \mathbb{Q}$.

□

REFERENCES

[Ham18] Richard Hammack, *Book of Proof*, 3 ed., Creative Commons, 2018.

University of Colorado, Department of Mathematics, Campus Box 395, Boulder, CO 80309-0395

Email address: casa@math.colorado.edu