

HOMework 7

MATH 2001

SEBASTIAN CASALAINA

ABSTRACT. This is the first homework assignment. The problems are from Hammack [[Ham18](#), Ch.5]:

- **Chapter 5** , Exercises: 1, 2, 3, 4, 5, 16, 17, 18, 19, 20

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CHAPTER 5

Ch.5, Exercise 1. Suppose $n \in \mathbb{Z}$. If n^2 is even, then n is even.

Solution to Ch.5, Exercise 1.

□

Ch.5, Exercise 2. Suppose $n \in \mathbb{Z}$. If n^2 is odd, then n is odd.

Solution to Ch.5, Exercise 2.

□

Ch.5, Exercise 3. Suppose $a, b \in \mathbb{Z}$. If $a^2(b^2 - 2b)$ is odd, then a and b are odd.

Solution to Ch.5, Exercise 3.

□

Ch.5, Exercise 4. Suppose $a, b, c \in \mathbb{Z}$. If a does not divide bc , then a does not divide b .

Solution to Ch.5, Exercise 4.

□

Ch.5, Exercise 5. Suppose $x \in \mathbb{R}$. If $x^2 + 5x < 0$ then $x < 0$.

Solution to Ch.5, Exercise 5.

□

Ch.5, Exercise 16. Suppose $x, y \in \mathbb{Z}$. If $x + y$ is even, then x and y have the same parity.

Solution to Ch.5, Exercise 16.

□

Ch.5, Exercise 17. If n is odd, then $8 \mid (n^2 - 1)$.

Solution to Ch.5, Exercise 17.

□

Ch.5, Exercise 18. If $a, b \in \mathbb{Z}$, then $(a + b)^3 \equiv a^3 + b^3 \pmod{3}$.

Solution to Ch.5, Exercise 18.

□

Ch.5, Exercise 19. Let $a, b, c \in \mathbb{Z}$ and $n \in \mathbb{N}$. If $a \equiv b \pmod{n}$ and $a \equiv c \pmod{n}$, then $c \equiv b \pmod{n}$.

Solution to Ch.5, Exercise 19.

□

Ch.5, Exercise 20. If $a \in \mathbb{Z}$ and $a \equiv 1 \pmod{5}$, then $a^2 \equiv 1 \pmod{5}$.

Solution to Ch.5, Exercise 20.

□

REFERENCES

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

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