

NT Exercises 2

"You don't need to go in order."

1* Prove that $\gcd(a, b) = \gcd(a, a+b)$.

4. The difference between two odd integers is 4. Prove that they must be relatively prime.

2. Prove that $a^2 \equiv (n-a)^2 \pmod{n}$. This result may be helpful for some homework questions. More generally, prove

$$(n-a)^m \equiv \begin{cases} a^m & \text{if } m \text{ is even} \\ n-a^m & \text{if } m \text{ is odd, modulo } n. \end{cases}$$

3. Find all integer solutions to $2xy = x^2 + 2y$.

5... Suppose $a, b, c \in \mathbb{Z}$ and $7 \mid a^3 + b^3 + c^3$. Prove $7 \mid abc$.

- AMP

- I hope my email was nice.

- I'll write proofs on the board ;

- Come talk to me 1-on-1 in office hrs about HW.

HW

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Sent by section!

$$x^2 + 19y^2 = 431$$

$$431 \equiv 19 \pmod{19} \implies 13 \equiv -6$$

$$\implies x^2 \equiv 13 \pmod{19}$$