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Name:

You must show your work to get full credit.

- 1. Define the following:
 - (a) $a \equiv b \pmod{n}$.
 - (b) a is divisor of b.
 - (c) r is a rational number.
 - (d) r is irrational number.
 - (e) The $absolute \ value$ of the number a.
- **2.** State the following:
 - (a) The division algorithm.
 - (b) The contrapositive of the statement: If n^3 is divisible by 3, then n is divisible by 3.
- **3.** Prove or give a counterexample: $(x+y)^5 \equiv x^5 + y^5 \pmod{5}$.

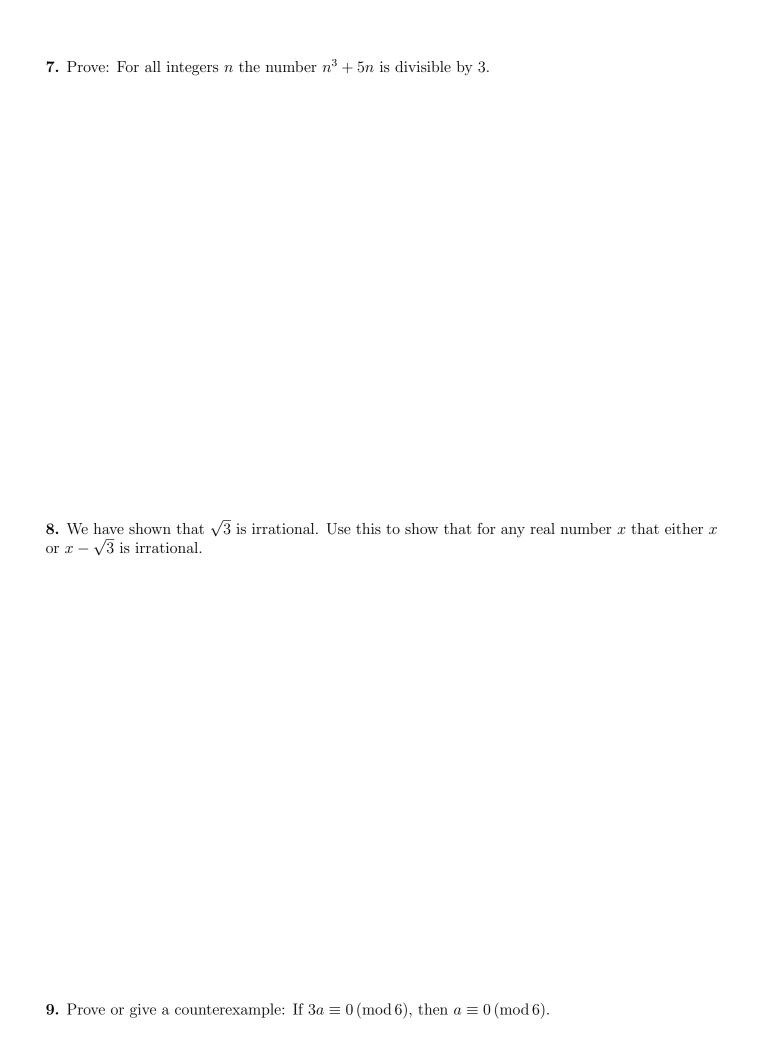
4. Compute the quotient and remainder when 7 is divided into -19.

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5. Prove: For any real numbers a and x, if |x-1|=a, then x=a+1 or x=-a+1.

6. Prove or give a counter example: If α is irrational, then $\frac{\alpha-1}{\alpha+1}$ is irrational.



10.	Prove or give a counterexample: If $3a \equiv 0 \pmod{5}$, then $a \equiv 0 \pmod{5}$.
11.	Prove that if a and b have the same remainder when divided by n, then $a \equiv b \pmod{n}$.