Remainders

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Quiz • 30 min

Review Learning Objectives

1. If $n \equiv 5 \mod 9$, what can be $n \mod 3$? **1 / 1 point**

- 1
- 0, 1 or 2
- 2

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Correct
3 divides 9, so remainder modulo 9 defines remainder modulo 3, and $5 \mod 3 = 2$.

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2. If $n \equiv 1 \mod 6$, what can be $n \mod 5$? **1 / 1 point**

- 1
- 1, 2 or 3.
- 0, 1, 2, 3 or 4

Correct
Correct! 5 and 6 are coprime, so the remainders modulo 5 and 6 are independent. In particular,

$25 \equiv 1 \mod 6, 25 \equiv 0 \mod 5,$

$1 \equiv 1 \mod 6, 1 \equiv 1 \mod 5,$

$37 \equiv 1 \mod 6, 37 \equiv 2 \mod 5,$

$13 \equiv 1 \mod 6, 13 \equiv 3 \mod 5,$

$19 \equiv 1 \mod 6, 19 \equiv 4 \mod 5.$

3. If $n \equiv 2 \mod 10$, then what can be $n \mod 6$? **1 / 1 point**

- 0, 2 or 4
- 0, 1, 2, 3, 4 or 5.
- 2
- 1, 2 or 4

Correct
Correct! If $n \equiv 2 \mod 10$, then 2 divides n, so n is even, and $n \mod 6$ can only be even. Also,

$12 \equiv 2 \mod 10, 12 \equiv 0 \mod 6,$

$32 \equiv 2 \mod 10, 32 \equiv 2 \mod 6,$

$22 \equiv 2 \mod 10, 22 \equiv 4 \mod 6.$

4. What is the smallest positive integer n such that $n \equiv 3 \mod 11$ and $n \equiv 7 \mod 17$? **1 / 1 point**

- 58
- 24
- 25
- 619

Correct
Correct! You could find this number either by trying all numbers with remainder 7 modulo 17 starting from $7, 24, 41, \ldots$ and computing their remainders modulo 11 until you find 58. Alternatively, you could use the algorithm from the lecture. First use Extended Euclid's Algorithm to find out that $1 = 14 \cdot 11 - 9 \cdot 17$. Then compute $n = 14 \cdot 11 \cdot 7 - 9 \cdot 17 \cdot 3 = 619$, then compute $619 \mod 11 \cdot 17 = 619 \mod 187 = 58$.