

Modular arithmetic computations review

Lecture 7b: 2022-03-02

MAT A02 – Winter 2022 – UTSC

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Adding in modular arithmetic

- When adding $a + b \pmod{n}$, two options:
 - (1) Add the two numbers in normal arithmetic first, and then divide to find the smallest positive label.
 - (2) Replace the two numbers with another number from their respective congruence classes first, then add, and then replace again.

Multiplying in modular arithmetic

- When multiplying $a \times b \pmod{n}$, two options:
 - (1) Multiply the two numbers in normal arithmetic first, and then divide to find the smallest positive label.
 - (2) Replace the two numbers with another number from their respective congruence classes first, then multiply, and then replace again. (sometimes helpful to use negatives)

Simple powers in modular arithmetic

- To compute powers, sometimes it is easier to break it up into a product and simplify.

Try it out

- $637 \times 437 \pmod{7}$
- $507 \times 237 \pmod{509}$
- $367^2 \pmod{369}$
- $7^6 \pmod{51}$

A: 0

B: 4

C: 35

D: 43

E: None of the above

Try it out

- $432903 + 1463974 \pmod{100}$

- $105 \times 237 \pmod{7}$

- $4502^2 \pmod{4507}$

- $76 \times 77 \times 78 \pmod{79}$

A: 0

B: 25

C: 73

D: 77

E: None of the above

Try it out

- $3^{64} \pmod{78}$

A: 3

B: 6

C: 9

D: 27

E: None of the above

Try it out

- $3^{64} \pmod{25}$

A: 3

B: 6

C: 9

D: 27

E: None of the above