MATH 120 In-class Activity
Day 25

Question 1. Decide whether each of these integers is congruent to 5 modulo 17:

(a) 80

(b) 103

(c) -29

(d) -122

Question 2. Define a **mod** b to be the unique integer c such that $0 \le c < b$ and $a \equiv c \bmod b$. Find each of these values:

(a) $(177 \bmod 31 + 270 \bmod 31) \bmod 31$

(b) $(177 \bmod 31 - 270 \bmod 31) \bmod 31$

(c) $19^2 \bmod 9$

Question 3.

(a) What time will it be 1000 hours from now?

(b) What day of the week will it be four years from today?

(c) How is this related to modular arithmetic?

Question 4.

(a) Completely write out the addition and multiplication tables for $\mathbb{Z}_6$:

+	0	1	2	3	4	5
0						
1						
2						
3						
4						
5						

×	0	1	2	3	4	5
0						
1						
2						
3						
4						
5						

(b) Highlight the places where "0" appears in the addition table. What do you notice about numbers such that $a + b \equiv 0 \bmod 6$?

(c) Highlight the places where "0" appears in the multiplication table. What do you notice about numbers such that $a \cdot b \equiv 0 \bmod 6$?

(d) Highlight the places where "1" appears in the multiplication table. What do you notice about numbers such that $a \cdot b \equiv 1 \bmod 6$?

Question 5. Show that if n is an integer, then either $n^2 \equiv 0 \bmod 4$ or $n^2 \equiv 1 \bmod 4$.