

Your Name:

Duration of the Quiz is 15 minutes. There are four problems, worth 20 points. Show all your work for full credit. Books, notes etc. are prohibited. Calculators are NOT permitted.

1. What are the quotient and remainder when 77 is divided by 21?
2. What are the quotient and remainder when -1 is divided by 23?
3. The set of integers modulo 5, \mathbb{Z}_5 , is a group under addition modulo 5. Write out the Cayley table for \mathbb{Z}_5 , and identify the additive identity and the additive inverse of each element.

4. Suppose that a and b are integers, $a \equiv 11 \pmod{19}$, and $b \equiv 3 \pmod{19}$. Find the integer c with $0 \leq c \leq 18$ such that

(i) $c \equiv 4a \pmod{19}$

(ii) $c \equiv a - b \pmod{19}$

(iii) $c \equiv 2a + 3b \pmod{19}$

(iv) $c \equiv a + 4b^2 \pmod{19}$