Module 4 Homework

Name:

Question 1

Using 4 as the modulus and whole numbers as the underlying set, list the congruence classes. Show the algebraic formula for each class and list at least 4 elements in each class.

Name the classes appropriately and don’t forget the square brackets!

Question 2

Using the stated number as the modulus and the new theorem about how to check if two numbers are congruent, discuss which of the following are true statements and why:

A 

B 

C 

D 

E 

Question 3

Give 3 numbers that are equivalent to your age and show WHY they are equivalent.

Question 4

Discuss why the set of equivalence classes mod 6 is a partition on the integers.

Question 5

Taking 29 from the set of all whole numbers, fill in the following blanks and show WHY your answer is true.

29 is in the \_\_\_\_\_\_\_congruence class mod 5.



29 is in [ \_\_\_\_\_ ] mod 7

Question 6

Illustrate this theorem:

If , then  for any natural number *n*. (*a* and *b* are integers, *m* is a natural number greater than 1.)

Illustration

Rewrite the theorem in “manglish”:

Question 7

Given a modulus of 8 and an underlying set of the whole numbers, in which congruence classes do the primes show up and why.

Question 8

Fill in the following blanks or answer the question

A [3] + [4]  \_\_\_\_\_\_

B [3] + [4]  \_\_\_\_\_\_

C  and both are in [2]. If we multiply both sides by two, in which congruence class do we land?

D  and both are in [2]. If we divide both sides by 2, we are no longer equivalent.

 Why?

Question 9

Make two Cayley tables: one for addition mod 4 and one for multiplication mod 4:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Question 10

Illustrate the theorem:

Every even power of any odd number is congruent to 1 mod 8, using whole numbers as the underlying set.