1

Math 3303 Final Exam

Question 1 14 points

Describe two partitions: the first one on all the natural numbers and the second one on all the real numbers. Tell why your description is a partition on the relevant set.

2

Question 2 12 points

Illustrate the theorem at least twice:

The square of any integer is in [0] or [1] mod 3 and not [2] mod 3.

3

Question 3 20 points

Short Answers needed:

3A Given that f(x) =  is one-to-one. What is the inverse function ?

3B Given  and , what is  ?

3C Is the set of all one-to-one functions with the operation composition a group?

Support your answer with function facts.

3D Given an example of a relation on two sets that is NOT a function. Explain why it is not.

4

Question 4 14 points

Why is the set of natural numbers mod 5 a group with the operation addition?

Sketch a Cayley Table and give your explanation in agonizing detail.

5

Question 5 20 points

Given this set of numbers: {  , , -1+ *i* , 6, 2}

Write each number below and pick the adjectives from the list below that apply to them:

Abundant, Algebraic, Complex, Composite, Deficient, Irrational, Perfect, Prime, Quaternion,Rational, Transcendental

6

Question 6 10 points

Illustrate the theorem:

If n is an integer, not divisible by 2 or 3, then  is divisible by 24.

7

Extra Credit Question 5 points

If ac  bc then a b where d = (c, m). a, b, c, and d are natural numbers, d is greater than 1 and both m and c are multiples of d.