

Math 3303

Online Midsemester

NAME:

Questions and Answer Booklet

The Rules: open internet, open book, open notes. No visiting with another human about the test questions. Please include cites if you use digital or print media.

Please put your name on this test booklet! Five points off for anonymous tests.

Question 1

20 points

- A. Select and discuss a partition of your choosing on the Natural numbers. In particular, discuss how you know it is a partition with a bullet list of reasons.
- B. Why is $4 + i$ a quaterion?
- C. Using properties of the number 1, add $\frac{1}{6} + \frac{1}{8}$. Show where you use the property.
- D. A circle represents $\frac{4}{7}$. How would you represent $\frac{4}{21}$? Show your work.

Question 2 10 points

Illustrate this theorem twice:

If a is a natural number, one of the following three numbers is divisible by 3: a , $a + 2$, or $a + 4$.

Question 3 20 points

Produce a Cayley table and discuss/illustrate why the following set and multiplication is a group.

The set is $\{-1, 1, i, -i\}$. Multiplication is the normal real number process.

Question 4 **25 points**

- A List the proper divisors of 12.
- B State the definition of “deficient” and give an example of a deficient number.
- C Find a gap of size 5 between two primes. Don’t worry about listing the primes, just list the 5 composite numbers and show your work.
- D List one Mersenne Prime and show it’s base 2 repunit form.
- E Create a prime free sequence. Show “ a ” and “ d ” and the first 6 elements of the sequence.

Question 5 13 points

Write a 3 or 4 paragraph essay on Lucky numbers. Be sure to describe very briefly how to find them. Compare and contrast to the Prime numbers. List 3 facts about Luckies and discuss why the Luckies matter.

Question 6 12 points

Compare and contrast one hundred and eleven (a base 10 number) and 111_2 . Describe each with as many vocabulary words as you can from the class (e.g. abundant, prime, complex,...)

Extra credit 5 points

What is the item you remember best from the videos? What made the biggest impression on you?