Math 150 – Spring 2017
Assignment: G6
Due today and Wednesday

Names: ______________________
____

Put any justification or explanations on the back, or separate sheets.

(1) Prove that 0.9999999 . . . . is exactly equal to 1.

(2) Prove that 0.4999999 . . . . is exactly equal to ½.

(3) Let E be the set of Even Natural Numbers.

a. Is E closed under addition? Show why or why not.

b. Is E closed under multiplication? Show why or why not.

c. Is E closed under subtraction? Show why or why not.

(4) Consider the “max” operation on the Natural Numbers defined by *m(a, b),* which simply returns the maximum of *a* and *b*. For example, *m(4, 3) = 4, m(1, 2) = 2,* and *m(6, 5) = 6*.

a. Is *m* commutative? Explain why or why not.

b. Is there an identity element for *m*? If so, what is it? If not, explain why.

(5) Consider the operation R on the Set of Natural Numbers, with zero included, defined as follows:

aRb is equal to the remainder when *b* is divided into *a*

(for example, 5R1 = 0, 5R2 = 1, and 8R5 = 3)

a. There is an identity element for *R*. What is it? Show how you know.

b. For any Natural Number *n*, what is the inverse of *n*? Is this inverse unique?

c. Is *R* distributive over addition? Show why or why not.

(6) Which property or properties are illustrated in each of the following expressions? Circle all that apply.

• 2(3 + 7) = 2*3 + 2* 7	Cl	Co	As	Di	Id	Inv
• 3 – 5 = 5 – 3	Cl	Co	As	Di	Id	Inv
• $3 \times \frac{1}{3} = 1$	Cl	Co	As	Di	Id	Inv
• 4 – 0 = 4	Cl	Co	As	Di	Id	Inv
• $\frac{2/5}{7}$ *is rational*	Cl	Co	As	Di	Id	Inv
• 4 – (5 + 3) = (4 – 5) – 3	Cl	Co	As	Di	Id	Inv

(Cl = Closure, Co = Commutativity, As = Associativity, Di = Distributive, Id = Identity, Inv = Inverse)

(7) For the sequences below,

- Find the next two terms.
- Circle A, G, ot F for Arithmetic, Geometric, or Fibonacci, or N nor None of these.
  - For Arithmetic sequences, identify the common difference (*d*).
  - For Geometric sequence, identify the common ration (*r*).
- Fill in the blanks

(1) $\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3},$ ______ , ______ A ($d =$ ____) G ($r =$ ____) F N

$a_8 =$ ______ $a_n =$ ______ $a_{62} =$ ______

(2) $-2, 4, -8, 16,$ ______ , ______ A ($d =$ ____) G ($r =$ ____) F N

$a_9 =$ ______ $a_n =$ ______ $a_{28} =$ ______

(3) $2\sqrt{3}, 6, 6\sqrt{3},$ ______ , ______ A ($d =$ ____) G ($r =$ ____) F N

$a_7 =$ ______ $a_n =$ ______ $a_{16} =$ ______

(4) $\frac{2}{3}, 1, \frac{3}{2}, \frac{9}{4}$ ______ , ______ A ($d =$ ____) G ($r =$ ____) F N

$a_5 =$ ______ $a_n =$ ______ $a_{51} =$ ______

(5) $0, \frac{2}{5}, \frac{2}{3}, \frac{6}{7}, 1, \frac{10}{9}$ ______ , ______ A ($d =$ ____) G ($r =$ ____) F N

$a_5 =$ ______ $a_n =$ ______ $a_{24} =$ ______