MATH 10771:   Exam #2 (Fall 2016)

1. Use order of operations to calculate the following. Show all work.

    (a) $8 \div 4 + 24 \div 3 \times 4 + 3 \cdot (11 - 3^2)$

    (b) $4 \times (9 + 2) - 16 \div 2 + (8 - 3) \times 6$

2. Determine the next <u>eight</u> numerals after 11100_{two}.

3. Identify the property being used.

    (a) $(5 \cdot 6) \cdot 3 = 3 \cdot (5 \cdot 6)$ (c) $9 \cdot 1 = 9$

    (b) $3(7 + 2) = 3 \cdot 7 + 3 \cdot 2$ (d) $7 + (6 + 2) = (7 + 6) + 2$

4. Convert each base ten numeral into its numeral in the base requested.

    (a)   825 into base six

    (b)   3429 into base eight

5. Convert each of the following numerals into its base ten numeral.

    (a) 2564_{seven}

    (b) $19B2_{\text{sixteen}}$

6. Explain why $0 \div 0$ is undefined. Be specific.

7. Explain why 0^0 is undefined. Be specific.

8. Using the properties of exponents, determine which is larger. STATE WHY!!! (Note answers without reasons will reason no credit).

   (a) 81^8 OR $3^{30} + 3^{30} + 3^{30} + 3^{30}$ (b) 16^{19} or 8^{25}

9. Find x: $5^5 \cdot 125^3 = 25^x$

10. Rewrite the following using a single exponent.

    (a) $12^4 \cdot 18^3 \cdot 9^6 \cdot 16^5 \cdot 27^3$

    (b) $64^3 \cdot 8^3 \div 32^2 \cdot 4^6$

11. Find 41×58 using the Russian Peasant Algorithm.

12. Find 56×47 using the Intermediate Algorithm (Partial Products).

13. Add the following numbers using the scratch algorithm. You MUST show all work.

$$\begin{array}{r} 9\ 5\ 3 \\ 7\ 2\ 5 \\ 3\ 5\ 9 \\ 4\ 2\ 7 \\ 3\ 6\ 1 \\ +\ \ \ 7\ 6\ 8 \end{array}$$

14. Compute the following:

    a) $9\ 5DB_{\text{sixteen}}$ b) $6\ 3\ 4\ 2_{\text{eight}}$
         $+\ A\ 7\ 3\ C_{\text{sixteen}}$ $-\ 3\ 7\ 6\ 5_{\text{eight}}$

15. Complete the following multiplication chart in base six.

×	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	2	3	4	5
2	0	2				
3	0	3				
4	0	4				
5	0	5				

16. Short Answer.

(a) For any nonzero whole number a, $0 \div a =$ _____.

(b) If $a \neq 0$, then $a^0 =$ _____.

(c) For any nonzero whole number a, $a \div 0 =$ _____.

(d) For the set of whole numbers, the additive identity is _____ and the multiplicative identity is _____.

(e) In the multiplication problem $3 \cdot 7 = 21$, the numbers 3 and 7 are called _____ and 21 is called the _____.

(f) In the addition problem $8 + 2 = 10$, the number 8 and 2 are called _____ and 10 is called the _____.

(g) State a property that whole number addition has that whole number subtraction does not. **Illustrate that whole number subtraction does not have this property**.

(h) Determine if the set $\{0, \ 1, \ 5\}$ is closed under multiplication. If not, tell why.

(i) Determine if the set $\{1, \ 3, \ 5, \ 7, \ 9, \ \ldots\}$ is closed under addition. If not, tell why.

17. Given below is the multiplication chart in base nine. Using the chart provided, find the following.

×	0	1	2	3	4	5	6	7	8
0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8
2	0	2	4	6	8	11	13	15	17
3	0	3	6	10	13	16	20	23	26
4	0	4	8	13	17	22	26	31	35
5	0	5	11	16	22	27	33	38	44
6	0	6	13	20	26	33	40	46	53
7	0	7	15	23	31	38	46	54	62
8	0	8	17	26	35	44	53	62	71

(a) $254_{\text{nine}} \times 73_{\text{nine}}$

(b) $564765_{\text{nine}} \div 7_{\text{nine}}$

ANSWERS

1. (a) 40   (b) 66

2. 11101; 11110; 11111; 100000; 100001; 100010; 100011; 100100

3. (a) commutative prop of multiplication   (c) identity prop
    (b) distributive prop   (d) associative prop of addition

4. (a) 3453_{six} (b) 6545_{eight}

5. (a) 977   (b) 6578

6. Show using the missing factor approach that there are an infinite number of solutions.

7. Show using the pattern approach

8. (a) 81^8 is larger since $9 \cdot 3^{30} > 4 \cdot 3^{30}$
    (b) 16^{19} is larger since $2^{76} > 2^{75}$

9. $x = 7$

10. (a) 6^{31} (b) 2^{29}

11. 2378 – Remember the russian peasant algorithm requires you to halve one column and double another.

12. 2632 – remember to show all steps and all partial products.

13. 3593 – remember to include all scratches in the correct locations.

14. (a) $13D17_{\text{sixteen}}$ (b) 2355_{eight}

15.

×	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	2	3	4	5
2	0	2	4	10	12	14
3	0	3	10	13	20	23
4	0	4	12	20	24	32
5	0	5	14	23	32	41

16. (a) 0
    (b) 1
    (c) undefined
    (d) 0;   1

    (e) factors; product

    (f) addends; sum

    (g) Many different answers: closure property, commutative prop; no identity prop

    (h) Not closed under multiplication since $5 \cdot 5 = 25 \notin \{0,\ 1,\ 5\}$

    (i) Not closed under addition since $1 + 3 = 4 \notin \{1,\ 3,\ 5,\ 7,\ \ldots\}$

17. (a) 21083_{nine}

    (b) 73234_{nine} with a remainder of 4