First name: _____ Last name: _____ Student ID: _____

Number Theory Homework

Basic problems:

1. Classify each number as prime or composite.

1. **62** ☐Prime ☐Composite	2. **93** ☐Prime ☐Composite	3. **71** ☐Prime ☐Composite	4. **32** ☐Prime ☐Composite
5. **11** ☐Prime ☐Composite	6. **34** ☐Prime ☐Composite	7. **98** ☐Prime ☐Composite	8. **67** ☐Prime ☐Composite

2. Find the least common multiple.

1. 6 and 8	2. 6, 18, and 48	3. 16 and 22
4. 4, 8, and 10	5. 15, 21 and 18	6. 33 and 132

3. Find the greatest common factor.

1. 96 and 12	2. 84 and 80	3. 45 and 24
4. 60, 72, and 36	5. 40, 55, and 60	6. 328, 216 and 400
7. xy, xyz	8. a^2bc^2, a^3b^2c	9. m^3n^4, m^2n^6
10. 39v, 30uv	11. $35n^2m$, $21m^2n$	12. $30y^3$, $20y^2$
13. 66yx, $30x^2y$	14. $36xy^3$, $24y^2$	15. 60y, $56x^2$
16. 105x, 30yx, 75x	17. 140n, $140m^2$, $80m^2$	18. $72ab^3$, $16a^3b^2c$, $20ab^3$

4. Find the prime factorization of each number. Express your answer in exponential form.

1. 164	2. 124	3. 270	4. 111
5. 108	6. 472	7. 360	8. 10500

Challenge Problems

1. The sum of four consecutive whole numbers is a multiple of 5. Which of the following statements about these four numbers is always true?
(**A**) The sum of the numbers ends in a 5. (**B**) The largest number ends in a 9.
(**C**) The smallest number is odd. (**D**) None of the numbers are multiples of 5.
(**E**) One of the numbers ends in a 3.

2. If $N = 2^5 \times 3^2 \times 7 \times \square$ and 100 divides evenly into N, which of the following numbers could be placed in the box?
(A) 5 (B) 20 (C) 75 (D) 36 (E) 120

3. The numbers from 1 to 5 are written in a 5 x 5 array so that each number appears exactly once in each row and each column. Some of the numbers have already been entered. What number goes in the place marked by the X?

	2		5	
	3		2	
1				4
			4	3
5		X		

4. There are various ways to make $207 using only $2 coins and $5 bills. One such way is using one $2 coin and forty-one $5 bills. Including this way, in how many different ways can $207 be made using only $2 coins and $5 bills?

5. The least common multiple of a and b is 12, and the least common multiple of b and c is 15. What is the least possible value of the least common multiple of a and c?

6. The digits 1, 2, 3, 4, and 5 are each used once to write a five-digit number PQRST. The three-digit number PQR is divisible by 4, the three-digit number QRS is divisible by 5, and the three-digit number RST is divisible by 3. What is P?

7. The decimal expansion of 2/13 is the repeating decimal 0.153846. What digit occurs in the 2008th place after the decimal point?

8. The sum of all of the digits of the integers from 98 to 101 is
   9 + 8 + 9 + 9 + 1 + 0 + 0 + 1 + 0 + 1 = 38
What is the sum of all of the digits of the integers from 1 to 2008?