MTH107 **Name:**__________________________

Practice Exam 2 **Section:**__________________________

This exam contains 6 pages (including this cover page) and 6 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and put your initials on the top of every page, in case the pages become separated.

You may *not* use your books or notes on this exam.

You are required to show your work on each problem on this exam. The following rules apply:

- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.
- **Mysterious or unsupported answers will not receive full credit**. A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.
- If you need more space, ask for an extra sheet of paper to continue the problem on; clearly indicate when you have done this.

Do not write in the table to the right.

Problem	Points	Score
1	5	
2	4	
3	4	
4	4	
5	4	
6	4	
Total:	25	

1. (5 points) Find the prime factorization and compute $D(n)$ for each of the numbers below.

   a) 55

   b) 32

   c) 341

   d) 231

   e) 1042

2. (4 points) Find the prime factorization and compute $S(n)$ for each of the numbers below and determine if the number is deficient, abundant, or perfect.

   a) 237

   b) 93

   c) 308

   d) 467

3. (4 points) Find all numbers equivalent to the given number for the stated modulus.

   a) 43 mod 2

   b) 782 mod 5

   c) 381 mod 17

   d) 738 mod 23

   e) 811 mod 6

   f) 939 mod 92

   g) 122 mod 19

   h) 303 mod 8

4. (4 points) Compute the following for the given modulus.

a) $[2] + [2] + [3] \bmod 2$

b) $[8] \cdot [12] \bmod 5$

c) $([21] \cdot [15]) + [21] \bmod 17$

d) $[-19] + [22] \bmod 6$

e) $[24] - [233] \bmod 21$

f) $[24] + [1] + [-18] \bmod 9$

g) $[93] + [2] + [31] \bmod 2$

h) $[10] \cdot [2] \cdot [18] \bmod 5$

5. (4 points) Evaluate whether or not the statement is true or false. If they are false give a counter example or state why they are false.

   a) The integers are closed under addition.

   b) The additive identity for the integers $\mathbb{Z}$ is 1.

   c) For mod 5 arithmetic the additive inverse of [2] is [3].

   d) The odd numbers are closed under addition.

6. (4 points) Complete the Cayley table for the given modular group.

$$\{[0], [1], [2], [3]\} \text{ under addition mod } 4$$