Discrete Math I
Worksheet #1 (12/1/11)

Name: _____

Instructions: Provide all steps necessary to solve the problem. Simplify your answer as much as possible. Additionally, clearly indicate the value or expression that is your final answer!

1.

A census taker came to a house and asked the mother for the ages of her three daughters. The mother told him that their ages multiplied together were 36. The census taker told the mother that knowing the product of their ages does not provide enough information to determine the ages of her daughters.

The mother responded, "Oh, I could tell you the sum of their ages, but you still would not know. My oldest girl doesn't like chocolate pudding. Now you have enough information to determine their ages."

Help the census taker determine the ages of each of the girls.

2. Which of the statements in each of the following lists are true?

(*a*)

1. Exactly one of the statements in this list is false.
2. Exactly two of the statements in this list are false.
3. Exactly three of the statements in this list are false.
4. Exactly four of the statements in this list are false.
5. Exactly five of the statements in this list are false.
6. Exactly six of the statements in this list are false.
7. Exactly seven of the statements in this list are false.
8. Exactly eight of the statements in this list are false.
9. Exactly nine of the statements in this list are false.
10. Exactly ten of the statements in this list are false.

(*b*)

1. At least one of the statements in this list is false.
2. At least two of the statements in this list are false.
3. At least three of the statements in this list are false.
4. At least four of the statements in this list are false.
5. At least five of the statements in this list are false.
6. At least six of the statements in this list are false.
7. At least seven of the statements in this list are false.
8. At least eight of the statements in this list are false.
9. At least nine of the statements in this list are false.
10. At least ten of the statements in this list are false.

(*c*)

1. At most one of the statements in this list is false.
2. At most two of the statements in this list are false.
3. At most three of the statements in this list are false.
4. At most four of the statements in this list are false.
5. At most five of the statements in this list are false.
6. At most six of the statements in this list are false.
7. At most seven of the statements in this list are false.
8. At most eight of the statements in this list are false.
9. At most nine of the statements in this list are false.
10. At most ten of the statements in this list are false.

Extra Credit: Golumb's self-generating sequence is the unique nondecreasing sequence of positive integers $a_1, a_2, a_3, \ldots$, which has the property that it contains exactly a_k occurrences of k for each positive integer k. List the first 20 terms of this sequence.

Discrete Math I – Solutions to Worksheet #1

1. List all possible order triples (x,y,z) such that

- x, y, and z are integers,
- $0 \le x \le y \le z$, and
- $xyz = 36$

(x,y,z)	$x + y + z$
(1,1,36)	38
(1,2,18)	21
(1,4,9)	14
(2,2,9)	13
(1,3,12)	16
(3,3,4)	10
(1,6,6)	13

Since two of the ordered triples sum to the same number (13), then the daughters ages must correspond to (2,2,9) or (1,6,6). Because the mother gives the clue that she has an oldest daughter, then the answer is (2, 2, 9).

2.

(*a*) Only 9 is true
(*b*) 1 through 5 are true
(*c*) All are true

Extra Credit: (1, 2, 2, 3, 3, 4, 4, 4, 5, 5, 5, 6, 6, 6, 6, 7, 7, 7, 7, 8, …)

Discrete Math I
Worksheet #1

P	Answer/Solution	*A %*	*M %*	O
1	The ages are 9, 2, and 2	*86*	*84*	**6**
2a	Only 9 is true	*94*	*100*	**1**
2b	1 through 5 are true	*73*	*60*	**0.5**
2c	All are true	*64*	*95*	**0.5**
Overall		*85*	*87*	**8**
Ec	(1, 2, 2, 3, 3, 4, 4, 4, 5, 5, 5, 6, 6, 6, 6, 7, 7, 7, 7, 8, …) {six students received some or all of the credit available}			**0.5**