**Problem 1: Division**

1.)24 = quotient, 3 = remainder

2.)116 = quotient, 49 = remainder

3.)0 = quotient, 77 = remainder

4.)5 = quotient, 36 = remainder

5.)1 = quotient, 28 = remainder

**Problem 2: GCD and LCM**

1.) 123 and 67

GCD = 1, LCM = = 8241

2.) 609 and 377

GCD = 29, LCM = = 7917

3.) 135 and 198

GCD = 9, LCM = = 2970

4.) 923 and 7238

GCD = 1, LCM = = 6680674

**Problem 3: Modulo Rules**

1.)

Exponentiation

Arithmetic

Arithmetic

5 Arithmetic

5 Arithmetic

Arithmetic and Modulo

2.) 7

7 Exponentiation

7 Arithmetic

7

71 = 1 Arithmetic and Modulo

3.)13

13 Exponentiation

13 Arithmetic

13 Arithmetic

13 Exponentiation

Arithmetic

13=133

Arithmetic

Exponentiation

Arithmetic

Arithmetic

Arithmetic

Modulo

4.)

Exponentiation

Arithmetic

11=4

Exponentiation

Arithmetic

11=9

Exponentiation

Arithmetic

Arithmetic

Modulo

5.)

Exponentiation

Arithmetic

Exponentiation

Arithmetic

13=1315

Arithmetic and Exponentiation

Arithmetic and Exponentiation

17=174

Modulo and Arithmetic

Modulo

**Problem 4: Divisibility**

1.) Prove that if 3 divides an integer x with a remainder of 1, 9 divides with a remainder of 1

Divisibility Rules

Algebra

Algebra

Distribution

Divisible by 9 with a remainder of 1

2.) Prove that if 5 divides an integer n with a remainder of 4, 10 divides with a remainder of 1

Substitution

Simplification

Expand

Distribution

Divisible by 10 with a remainder of 1

3.) Prove that if 7 divides an integer n with a remainder of 4, 21 divides with a remainder of 6

Substitution

Simplification

Expand

Distribution

Divisible by 7 with a remainder of 6

4.) Determine, with proof, all pairs of integers (x,y) which satisfy the equation

Given

Distribution

Distribution