Exercise 2.2: Proofs About Numbers CS 210 September 19th, 2016

Team Name:

Instructions

Only one sheet per team will be turned in. Each team member can work on their own sheet for practice, but then the group as a whole should discuss the answers and collaborate on the turn-in sheet. Everyone can take home their own sheets.

Team Info (only fill out for the sheet to be turned in)

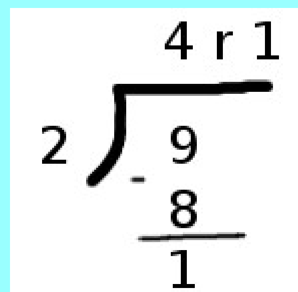
Team Name:

Group members (up to four): 1. 2.

3. 4.

Introduction 1

Modulus is a mathematical operation where the result is the *remainder* of a division.



For example, 9 / 2 = 4.5 (or, 4 + 1/2)

If we did integer division (meaning no remainder), 9 / 2 = 4.
Then, if we do 9 mod 2, the result of that is 1.

In general terms, *a mod b = r , and* $a=b\cdot q+r$

Question 1

Calculate the following. Also express $a=b\cdot q+r$, where $0\leq r<b$; r is the answer.

a) 13 mod 5 ($13=5\cdot q+r$)

b) -19 mod 3

c) 7 mod 9

d) 21 mod 7

Introduction 2
A counterexample is a way to disprove a proposition. For implications, if we can come up with *some hypothesis* that results in the *conclusion* being false, then we can disprove a statement.

In Practice Problem 4 from book, the statement is made…:

For every integer $n \geq 1$, if *n* is odd, then n^2+4 is a prime number.

Several examples given don't disprove this statement:

$$3^2+4=13 \quad , \quad 5^2+4=29 \quad , \quad 7^2+4=53$$

But as long as at least one can be found, then we can use this as a counterexample to disprove it:

$9^2+4=85$, 85 is divisible by 5 and 17.

Question 2
Prove the following: If *n* is odd, then n^2+2n is odd.