

# CS 173: Discrete Structures, Fall 2009

## Quiz 1 Review problems

Here are some short answer problems that will be helpful in preparing for the first quiz. Please do them and then check your answers against the posted solutions. You do not need to hand these in for us to grade.

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### 1. [8 points] Primes

- (a) Express the numbers 350, 105, and 64 as products of primes.

**Solution:**  $350 = 2 \cdot 5^2 \cdot 7$ ,  $105 = 3 \cdot 5 \cdot 7$ , and  $64 = 2^6$

- (b) Compute  $\text{GCD}(350, 105)$ ,  $\text{GCD}(105, 64)$ , and  $\text{LCM}(350, 64)$ . Feel free to give large results as products of primes; multiplying them out is not necessary.

**Solution:**

$$\text{GCD}(350, 105) = 5 \cdot 7$$

$$\text{GCD}(105, 64) = 1$$

$$\text{LCM}(350, 64) = 2^6 \cdot 5^2 \cdot 7$$

- (c) According to the definitions given in the book (or in lecture 7), which integers are neither prime nor composite?

**Solution:** All integers which are strictly less than 2.

### 2. [7 points] Divisibility, congruence mod k

Which of the following statements are correct? Show work or give brief explanations for your answers.

**Solution:**

- (a)  $-6 \mid 30$  is correct because  $30 = (-6) \cdot (-5)$ .
- (b)  $30 \mid -6$  is incorrect because  $\nexists k \in \mathbb{Z}$  such that  $-6 = 30 \cdot k$ .
- (c)  $6 \mid -30$  is correct because  $-30 = 6 \cdot (-5)$ .
- (d)  $-18 \mid 0$  is correct because  $0 = -18 \cdot 0$ . Zero is a multiple of any integer.
- (e)  $0 \mid -18$  is incorrect because  $0n$  is always 0, not -18.

### 3. [7 points] Miscellaneous questions

- (a) When is  $\lfloor x \rfloor$  equal to  $\lceil x \rceil$ ?

**Solution:** When  $x$  is an integer.

- (b) Is zero even? odd? neither?

**Solution:** Zero is even. "Even" is the same as "multiple of 2."

(c) Is zero prime?

**Solution:** Zero is not prime. The term prime (likewise composite) applies only to integers  $\geq 2$ .