

COT 3100 Homework #5: Integers, Division, GCD

Due Date: Friday, February 21st, in recitation

1) (5pts) Determine the prime factorizations of the following integers:

- a) 46008 b) 54839025 c) 31659 d) 1013 e) 396842322

Note: if you use a program to solve these, please attach a print out of your program to the back of your homework. You may use a calculator to solve these as well. If you do the latter, list out which prime factors you tried and how you determined whether or not what was leftover was prime.

2) (15 pts) Find the number of divisors of each of the questions in #1 as well as the sum of those divisors.

3) (10 pts) Run the Sieve of Eratosthenes for the integers 1 through 121, with the following modifications:

1) Stop the outer loop after crossing off multiples of 11, since every composite integers less than or equal to 121 has at least one multiple less than equal to 11.

2) If a number you arrive at is already crossed off, do not cross of its multiples again, just advance to the next number.

Count the number of times a value is crossed off in running the algorithm. (For example, on the first iteration, 2 is circled and all of its multiples, from 4 to 120 are crossed off. This counts as 59 cross offs.)

Note: Either show your work by hand or attach a program that makes the calculation for you.

4) (10 pts) Find the following greatest common divisors using Euclid's Algorithm. **Note: NO CREDIT WILL BE GIVEN IF YOU USE ANOTHER METHOD.**

- a) $\gcd(374, 191)$ b) $\gcd(532, 189)$ c) $\gcd(233, 144)$

5) (10 pts) Using the Extended Euclidean Algorithm, find all sets of integers a and b which satisfy the following equation: $374a + 191b = 1$.