

COT 3100 Fall 2022 Homework #4
Please Consult WebCourses for the due date/time

- 1) Find all integer solutions to the equation $1077x + 312y = 21$.
- 2) (a) Find all integer solutions to the equation $144x + 83y = 1$.
(b) Find all integer solutions to the equation $144x + 83y = 11$.
(c) Find $83^{-1} \pmod{144}$. (Note: Answer must be in between 0 and 143, inclusive.)
- 3) Let $a = 2^23^95^87^4$, $b = 2^73^65^811^4$, and $c = 2^53^55^{10}11^3$. Determine, in prime factorized form, both $\gcd(a, b, c)$ and $\text{lcm}(a, b, c)$.
- 4) For the numbers a , b and c listed in problem 4, determine the number of divisors each of those numbers has.
- 5) How many zeroes are at the end of $\frac{3000!}{1500!1500!}$?
- 6) Prove that $\gcd(a, b) \times \gcd(a, c) \times \gcd(b, c) \geq (\gcd(a, b, c))^3$ for all positive integers, a , b , and c . Intuitively, without proof (though if you can provide a proof that would be great), determine the situations where the two sides of this equation are equal. (Note: The originally posed question is relatively easy, so be looking for straight-forward observations about the property of the gcd function as opposed to something detailed and esoteric.)
- 7) Give a summary of the life and mathematical contributions of Carl Friedrich Gauss.