

COT 3100 Recitation: Use of Factorization of Integers, Algebraic Expressions

Set #1

- 1) The zeros of the function $f(x) = x^2 - ax + 2a$ are integers. What is the sum of the possible values of a ?
- 2) What is the smallest possible positive integer x such that $1260x = N^3$, where N is some positive integer?
- 3) The number $10!$, when written in base 12, ends in how many zeroes? (Challenge: figure out a fast algorithm to solve this problem when the factorial can be quite large and the base is anything that is easy to prime factorize.)
- 4) Let A , M and C be non-negative integers such that $A + M + C = 12$. What is the maximum value of $AMC + AM + MC + AC$?

Set #2

- 1) Both roots of the quadratic equation $x^2 - 63x + k = 0$ are prime numbers. How many possible values for k are there?
- 2) How many positive integers less than 200 have an odd number of positive integer divisors?
- 3) The number $2^{48} - 1$ is exactly divisible by two numbers between 60 and 70. What are they?
- 4) Integers x and y with $x > y > 0$ satisfy $x + y + xy = 80$. What is x ?