Syllabus for the CS111 Quiz 2

Topics:

- Asymptotic notation:
    - big-O, big-Omega, big-Theta notations
    - polynomial, exponential, and logarithmic functions
    - estimating the growth of functions using O, Ω, Θ: express the magnitude of function f(n) using the Θ notation, where f(n) = 4n^3 + 2^n + 1
    - estimating the running time of algorithms (given a piece of pseudo-code, determine its asymptotic running time)
- Number theory:
    - Primes, composite numbers, factorization
    - Common divisors and multiple, relation to factorization
    - Greatest common divisor, least common multiple (definition, examples)
    - Greatest common divisor, computing gcd(a,b) using Euclid's algorithm (state the algorithm, execute on examples)
    - gcd(a,b) as a linear combination of a,b. Using Euclid's algorithm to compute α and β satisfying $\alpha a + \beta b = gcd(a,b)$.
    - Modular arithmetic: computing sum, difference, multiplication, or powers modulo a number. Example: compute 7^{547549} rem 8.
    - Fermat's little theorem.
    - Inverses modulo a prime. Using linear combinations or FLT to compute inverses.
    - Solving linear congruences. Example: find x such that 7x = 5 (mod 19).