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Group 10

Project 1: Factoring Algorithm

**Exercise 1**

If we perform (N mod p = 0) with p starting at 1 and ranging up to square root N, with N being a 25 digit number, then we will perform roughly 9\*(10^11) calculations. With a speed of 10^6 computations per second, it would take 10^6 seconds to compute the prime factors of a 25 digit number.

**Exercise 2**

The amount of primes in range 0 to x is approximately x/log(x).

The amount of primes in range 0 to 10^12 is 10^12/log(10^12), however we only have to test primes of order 12 so we can subtract 10^11/log(10^11) we get approximately 6.78\*10^10 primes. The amount of primes divided by the 10^6 calculations/s gives a total computation time of 6.78\*10^4s, making computation time 100x faster.

It requires storing (6.78\*10^10) 12 digit numbers. If each 12 digit number is 5 bytes, then we would need 5\*(6.78\*10^10) bytes of memory. This is about 300 gigabytes which would cost about 500SEK, which would be in the student range.

**Exercise 3**

Number: 211014499133641692110753

Factorization: 442140842411 \* 477256292323

Running Time: 105 seconds

Total Project Time: 8 hours

