CS 170 Final

Euclid's GCD: $O(n^3)$

```
def gcd(a,b):
    if b==0:
        return a
    return gcd(b, a mod b)
```

Extended GCD: $O(n^3)$

```
def extended-gcd(a,b):
    if b==0:
        return (1, 0, a)
    (x', y', d) = extended-gcd(b, a mod b)
    return (y', x' - floor(a/b)*y', d)
```

if d divides a and b and $d = ax + by$ for some integers s and y, then d = gcd(a, b)

Multiplicative Inverse

inverse of a,

$$ax \equiv 1 (\texttt{mod}\ N)$$

for any $a(\texttt{mod}\ N)$, a has a multiplicative inverse if and only if they are relatively prime, gcd(a,N) = 1