CS222 - Algorithm Design

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Assignment 7 - Extended Euclid's algorithm

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Problem Statement

1. (15 points) Write a recursive program that takes a and b as input from the user and outputs $\gcd(a, b)$ and the integers x, y such that $\gcd(a, b) = ax + by$. The output should be clearly understandable. Example:

   `Input the two numbers: 3 2.`

   `The gcd of 3 and 2 is 1.`

   $1 = (1) * 3 + (-1) * 2.$

   In the pdf file, write the time analysis and sample output on 21 and 14.

Here is the Sample Input and Output:

```
a.exe
Input the two numbers: 21 14

The gcd of 21 and 14 is 7.

Using extended Euclids algorithm to represent as gcd(a, b) = ay + bx

7 = (1)*21 + (-1)*14
```

Time Complexity

If the input **a** is of **m** bits, **b** is of **n** bits,

- The complexity of divide (int a , int b) is of **O($m \times n$)**
- The complexity of gcd (int a , int b) is of **O($m^2 \times n$)**