

Greatest Common Denominator

- examples:
- 1) $10 \overset{x}{} \overset{y}{5} \rightarrow 5$
 - 2) $13 2 \rightarrow 1$
 - 3) $24 18 \rightarrow 6$
 - 4) $36 22 \rightarrow 2$

if ($x > y$)

| | x | y | $x \% y$ |
|----|-----|-----|----------|
| 1) | 10 | 5 | 0 |
| 2) | 13 | 2 | 1 |
| | 2 | 1 | 0 |
| 3) | 24 | 18 | 6 |
| | 18 | 6 | 0 |
| 4) | 36 | 22 | 14 |
| | 22 | 14 | 8 |
| | 14 | 8 | 6 |
| | 8 | 6 | 2 |
| | 6 | 2 | 0 |

$z = x \% y$
 $x = y$
 $y = z$

if ($z == 0$)
return y

if ($x < y$)

| | | | |
|----|----|----------|----------|
| | | | $x \% y$ |
| 1) | 5 | 10 | 5 |
| | 10 | <u>5</u> | 0 |
| 2) | 2 | 13 | 2 |
| | 13 | 2 | 1 |
| | 2 | <u>1</u> | 0 |

∴ still okay

```
while (true) {
    z = x % y
    if (z == 0) return y
    x = y
    y = z
}
```

Recursive solution

```
gcd(x, y) {
    z = x % y
    if (z == 0)
        return y
    return gcd(y, z);
}
```

ASM

L1:

$z = x \text{ Mod } y (?)$

cmp z, 0

je L2

mov x, y

mov y, z

L2: ret ; answer in y