18.10.24

$$T(n) = T\left(\frac{n}{5}\right) + T\left(\frac{7n}{10}\right) + cn =$$

$$= cn + T\left(\frac{n}{5\cdot 5}\right) + T\left(\frac{n\cdot 7}{5\cdot 10}\right) + c\frac{n}{5} + T\left(\frac{7n}{10\cdot 5}\right) + T\left(\frac{49}{100}n\right) + \frac{7}{10}cn =$$

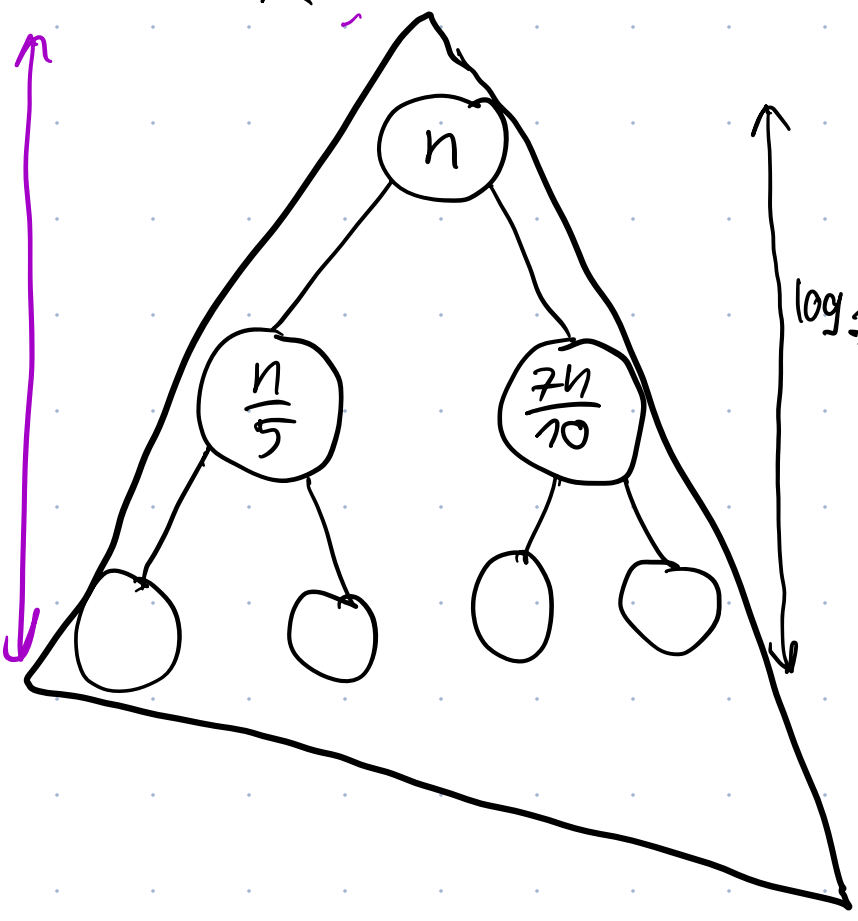
$$= cn\left(\underbrace{1 + \underbrace{\frac{1}{5} + \frac{7}{10}}_{\frac{81}{100}}}\right) + T\left(\frac{n}{25}\right) + T\left(\frac{7n}{50}\right)\cdot 2 + T\left(\frac{49n}{100}\right) =$$

$1 + \frac{9}{10} + \ldots$

$$\frac{n}{5^m} = 1 \qquad n = 5^m$$

$$\log_5 n = m$$

$$= cnK$$



cn

$\log_{\frac{10}{7}} n$

$$cn\frac{9}{10} = cn\frac{1}{5} + cn\frac{7}{10}$$

$$\sum_{i=0}^{\log_{\frac{10}{7}} n} cn\left(\frac{9}{10}\right)^i$$

$$1 + \alpha + \ldots + \alpha^k = \frac{\alpha^{k+1} - 1}{\alpha - 1} =$$

$$= \frac{1 - \ldots}{1 - \frac{9}{10}} < 10$$

n - бит. число a

m - бит. степень b

k - бит. модуль c

$a \rightsquigarrow \widetilde{a} = a \bmod c$

k-бит

$2k^2 m$

$n \to 3n \to 7n \to 15n \to \dots \to (2^m - 1)n$

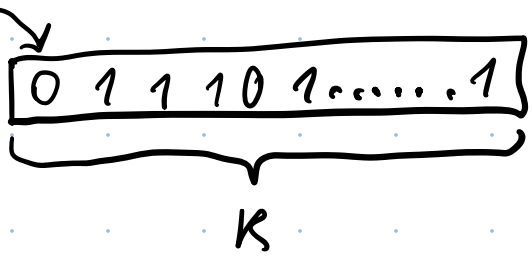
$n^2 + n^2$ $\quad gn^2$ $\quad ugn^2$ $\quad O\left(2\left(\left(2^{m-1} - 1\right)n\right)^2\right)$

---

n КАМНЕЙ

0 / 1

1. i_1 ? 0 / 1
2. i_2 ? 0 / 1

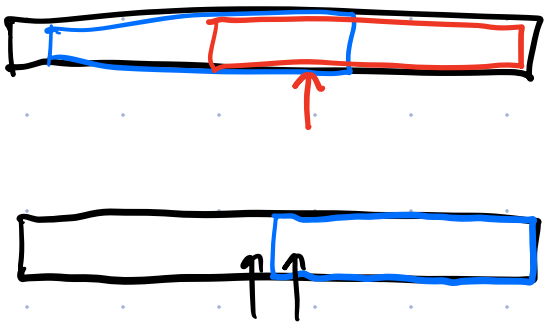


$2^k \geq n$

$k \geq \log_2 n$

$k = \lceil \log_2 n \rceil$

ЗАДАЧА ПРО majority element ($\geq \lceil \frac{n}{2} \rceil$)



X
num_x


```
def majority_element(arr):
    s = stack()

    for a in arr:
        if (stack.empty()):
            s.push(a)
        else:
            if (s.top()==a):
                s.push(a)
            else:
                s.pop()
```

1 1 1 1 2 3 4 5

РАСШИРЕННЫЙ АЛГ. ЕВКЛ.

$gcd(a,b) = d$

$d = ax + by$

$a = 24$
$b = 15$ // $d = 3$

$gcd(a,b) = gcd(b, a \bmod b)$

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

a	b	d	$\lfloor \frac{a}{b} \rfloor$	x	y
24	15	3	1	2	$-1-1\cdot2=-3$
15	9	3	1	-1	$1-1\cdot(-1)=2$
9	6	3	1	1	$0-1\cdot1=-1$
6	3	3	2	0	$1-2\cdot0=1$
3	0	3	—	1	0

$a \cdot x + b \cdot y = d$

$24 \cdot 2 - 15 \cdot 3 = 48 - 45 = 3$

$d = ax + by$ ← к-й уровень

$d = bx' + (a \bmod b)y'$ ← к+1-й

$a \bmod b = a - b \cdot \lfloor \frac{a}{b} \rfloor$

$d = bx' + (a - b \cdot \lfloor \frac{a}{b} \rfloor)y'$

$d = bx' + ay' - b\lfloor \frac{a}{b} \rfloor y'$

$d = b(x' - \lfloor \frac{a}{b} \rfloor y') + ay'$

$d = ax + by$

$x = y'$

$y = x' - \lfloor \frac{a}{b} \rfloor y'$