MAXimal

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Finding divider

- Solution for the case of composite k

Given two nu
Required to calculate with any degree of the divisor $k$is one $n!$,
ie find the largest $x$such that $n!$is divided into k^x.

Solution for the case of simple k

Consider first the case when $k$simple.

We write down the expression for the factorial explicitly:

$$n! = 1\ 2\ 3\ \ldots\ (n-1)\ n$$

Note that each $k$member of the th of this work is divided into k, ie allows one to answer; the number of such members of the same $\lfloor n/k \rfloor$.

Further, we note that each k^2th term of this series is divided into k^2, ie gives one more to the answer (given that $k$in the first degree has already been considered before); the number of such members of the same $\lfloor n/k^2 \rfloor$.

And so on, every k^ith term of the series gives one to answer, and the number of members equal $\lfloor n/k^i \rfloor$.

Thus, the magnitude of response is:

$$\frac{n}{k} + \frac{n}{k^2} + \ldots + \frac{n}{k^i} + \ldots$$

This amount, of course, is not infinite, because only the first about $\log_k n$the members are non-zero. Consequently, the asymptotic behavior of the algorithm is $O(\log_k n)$.

Implementation:

```
int fact_pow (int n, int k) {
        int res = 0;
        while (n) {
                n /= k;
                res += n;
        }
        return res;
```

```
}
```

Solution for the case of composite k

The same idea is applied directly anymore.

But we can factor k, solve the problem for each of its prime divisors, and then select the minimum of the answers.

More formally, let k_i- this is ith factor of the number $k$belongs to him in power p_i. We solve the problem for $k_i$using the above formula for $O(\log n)$; though we got an answer Ans_i. Then the answer for the composite $k$will be a minimum of values Ans_i / p_i.

Given that the factorization is performed in the simplest way $O(\sqrt{k})$, we obtain the asymptotic behavior of the final $O(\sqrt{k})$.

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В конце, наверное, асимптотика sqrt(k), а не из N?

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