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exponentiation

is there is any optimization ?

if n is even

$$X^n = (X^2)^{n/2}$$

$$3^{10} = (3^2)^5 = 9^5$$

fastpower

Vizle

exponentiation

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if n is odd

$$X^n = X * X^{n-1}$$

$$9^5 = 9*9^4 = 9*(9^2)^2 = 9*(81)^2$$

fastpower

how to code this ?

```
int binaryExponentiation(int x,int n)
{
    int result=1;
    while(n>0)
    {
        if(n % 2 ==1)
            result=result * x;
        x=x*x;
        n=n/2;
    }
    return result;
}
```

time complexity for this is log(n)

Modular exponentiation

what's Modular exponentiation?

how to code this ?

as you can tell
the answer for calcuting exponentiation
can be large so we need to compute the mod
for the answer

$$2^{(10^{18})}$$

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