Lab A: Skolem

An infinite Skolem sequence $a[0], a[1], a[2], \ldots$ satisfies the following two conditions:

- for every $n \in \mathbb{N}$, there exist exactly two integers $i$ and $j$ such that $a[i] = a[j] = n$. Furthermore, $i - j = n$.
- for every $n < m$, if $i$ and $j$ are the smallest such that $a[i] = n$ and $a[j] = m$, then $i < j$.

Here are the first few terms:

1 1 2 3 2 4 3 5 6 4 7 8 5 9 6 ...

Given an array of size $k$, fill the array with the first $k$ terms of the infinite Skolem sequence. Hint: Initialize the array to zeros. Then for every $n$ in increasing order, find the first spot that is available, say $i$, and assign $a[i]$ and $a[i + n]$ the value $n$. But make sure not to exceed the boundary of the array.

```c
void SkolemFill(int * a, int k) {...}
```

continue — — >
Lab B: Imaginary numbers
Consider the following class for imaginary numbers:

class Im {
    double r;
    double i;

public:
    Im() {...}
    Im(double rl) {...}
    Im(double rl, double imgnr) {...}

    void set(double rl, double imgnr) {...}

double real() {//returns the real part}
double im() {//returns the imaginary part}
bool isIm() {//returns true iff imaginary part is not zero}

    void print() {cout<<r<<"+i"<<i;}

    Im add(Im n) {...}
    Im sub(Im n) {...}
    Im mul(Im n) {...}
    Im div(Im n) {...}
};

Complete the implementation of the class.
Note:

\[(a + ib) + (c + id) = (a + c) + i(b + d)\]

\[(a + ib) - (c + id) = (a - c) + i(b - d)\]

\[(a + ib)(c + id) = (ac - bd) + i(ad + bc)\]

\[(a + ib)/(c + id) = (a/l + ib/l)(c - id)\]

where \(l = c^2 + d^2\).