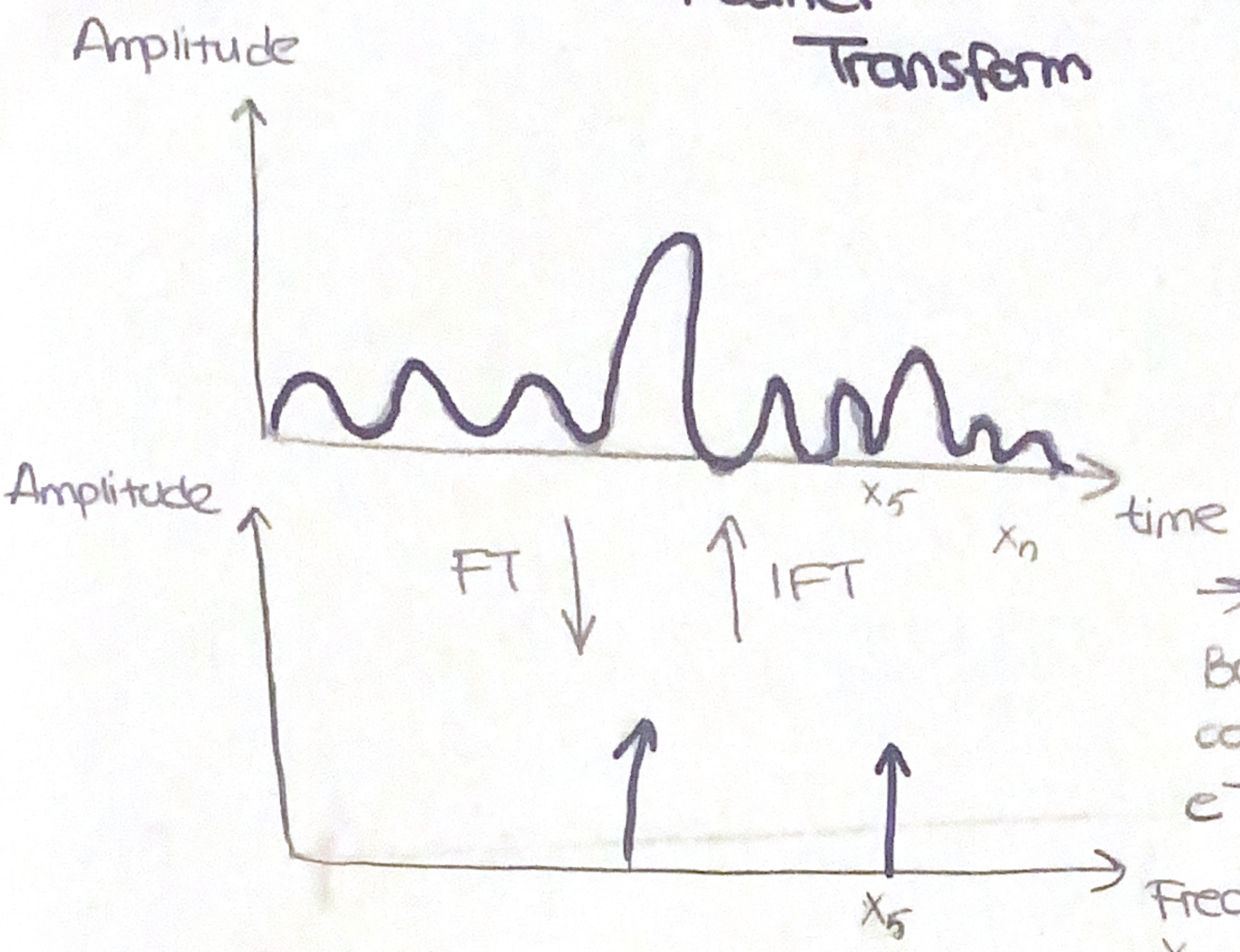
Fourier Transform



$x_n : x_0, x_1, \dots x_{N-1}$

x_0	x_1	...	x_{N-1}

↓ find coordinates

- Euler formula

$\Rightarrow e^{-ix} = \cos x - i \sin x$

Based on this we calculate bins.

$e^{-i 2\pi k n / N}$ } our sinusoidal coordinates (frequencies)

↓ # bins

I have to check similarity of every coordinate (for different k's) with my signal.

} Big similarity

} Small similarity

$N-1$ ↗ size of signal

FT for one bin only $\rightarrow X_k = \sum_{n=0} x_n e^{-2\pi i k n / N}$

We need 2 for loops to calculate all k's

```
* def myDFT(x_n):
      N = len(x_n)
      for k=0:N-1
          x_k = 0
          for n=0:N-1
              x_k = x_k + x_n[n+1] * exp(-2 * i * pi * n * k/N)
                          ↑ element (signal)
          output[k+1] = x_k
```

We'll calculate this for:

	n=0	n=1	n=2	n=3
k=0	00	01	02	03
k=1	10	11	12	13
k=2	20	21	22	23
k=3	30	31	32	33