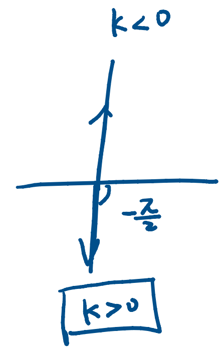
Prelab3

1. $a_0 = 0.5$ $\qquad a_k = \frac{1}{jk\pi} = \frac{-j}{k\pi}$

$$|a_k| = \sqrt{\left(\frac{1}{k\pi}\right)^2} = \frac{1}{k\pi} \qquad \angle a_k = \tan^{-1}\left(\frac{-\frac{1}{k\pi}}{0}\right) = -\frac{\pi}{2}$$



$$x(t) = 0.5 + \sum_{k=1}^{\infty} \frac{2}{k\pi} \cos\left(k\frac{2\pi}{0.05}t - \frac{\pi}{2}\right)$$

2. length T $\qquad 0 \sim N$, f_0 $\qquad F_s$

$\frac{T}{F_s}$ $\qquad f_0 \downarrow 2\pi f_0 = \omega_0$ $\qquad$ np.angle( ) np.abs( )

```
def x(Fourier_Coef, f, T, Fs):
    t = np.arrange(0,T,1/Fs)
    xt = ones(lens(t)) * Fourier_Coef[0]
    w = 2*np.pi*f
    N = lens(Fourier_Coef)

    for k in range (1, N):
        xt = xt+2*np.abs(Fourier_Coef[k])*np.cos(k*w*t+np.angle(Fourier_Coef[k]))

    return xt
```

3. $F_s = 11025\ Hz$ $\qquad T_s = \frac{1}{11025}$

$200ms \rightarrow 0.2s$

$$\frac{0.2}{T_s} = 0.2 \times 11025 = 2205 \quad \text{(index)}$$

4

$0.1 \times 11025 = 1102.5$ $\qquad 2^n = 1102.5$

$n \ln 2 = \ln 1102.5$

$n \approx 10$

$$\text{Freq resolution} = \frac{f_s}{} = \frac{11025}{} = 11025$$

Freq resolution $= \dfrac{f_s}{N} = \dfrac{11025}{10} = 1102.5$