

Ch5 Lecture 2

```
import numpy as np
import matplotlib.pyplot as plt
import imageio

def sincurve(omega):
    x = np.linspace(0, 4*np.pi, 200)
    y = np.sin(omega*x)
    return x, y

def sincurve_with_phase(omega, phase):
    x = np.linspace(0, 4*np.pi, 200)
    y = np.sin(omega*x + phase)
    return x, y

def plot_two_sincurves(omega1, omega2, phase1, phase2):
    x1, y1 = sincurve_with_phase(omega1, phase1)
    x2, y2 = sincurve_with_phase(omega2, phase2)
    plt.plot(x1, y1, label=f'$\omega={\omega1}$')
    plt.plot(x2, y2, label=f'$\omega={\omega2}$')
    plt.legend()
    plt.show()

# make an animation showing the phase of curve 2 changing from 0 to pi, while the phase of curve 1 is fixed at 0

import matplotlib.animation as animation

def animate_phase_change(omega1, omega2):
    x1, y1 = sincurve_with_phase(omega1, 0)
    x2, y2 = sincurve_with_phase(omega2, 0)
    fig, ax = plt.subplots()
    line1, = ax.plot(x1, y1, label=f'$\omega={\omega1}$')
    line2, = ax.plot(x2, y2, label=f'$\omega={\omega2}$')
```

```

collection1 = ax.fill_between(x1, y1, y2, where=(y1*y2>0), color='red', alpha=0.5)
collection2 = ax.fill_between(x1, y1, y2, where=(y1*y2<0), color='blue', alpha=0.5)
plt.legend()

def update(phase):
    y2 = np.sin(omega2*x2 + phase)
    line2.set_ydata(y2)
    p1=ax.fill_between(x1, y1, y2, where=(y1*y2>0), color='red', alpha=0.5)
    p2=ax.fill_between(x1, y1, y2, where=(y1*y2<=0), color='blue', alpha=0.5)

    return line2,p1,p2

anim = animation.FuncAnimation(fig, update, frames=np.linspace(0, np.pi, 100), interval=100)
plt.show()

return anim

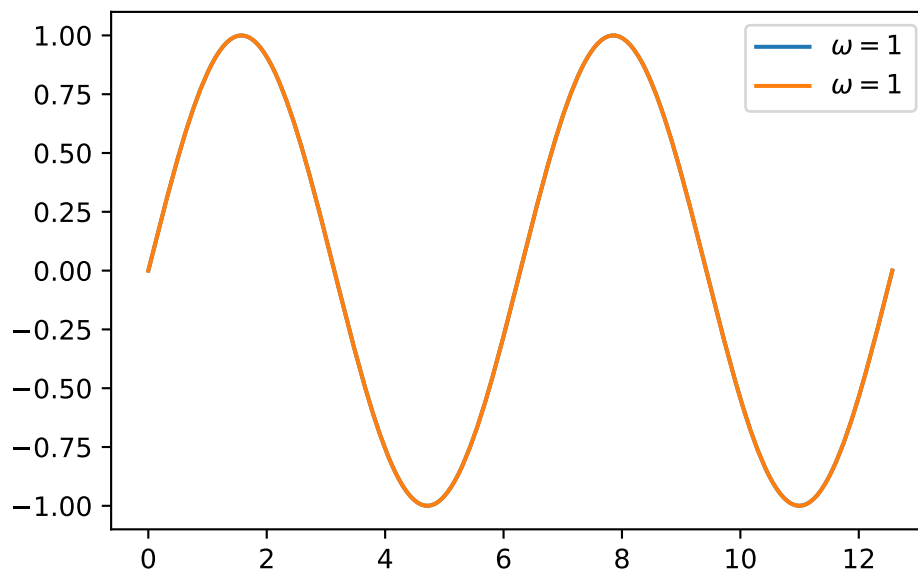
```

```

anim = animate_phase_change(1, 1)

from IPython.display import HTML
HTML(anim.to_jshtml())
#plot_two_sincurves(1, 1, np.pi, 0)

```



<IPython.core.display.HTML object>