

In this class, we will discuss 4 different forms of the solutions of the equation of motion for a simple harmonic oscillator:

$$\text{A Form: } x(t) = A \cos(\omega t + \phi)$$

$$\text{B Form: } x(t) = B_1 \cos(\omega t) + B_2 \sin(\omega t)$$

$$\text{C Form: } x(t) = C e^{i\omega t} + C^* e^{-i\omega t}$$

$$\text{D Form: } x(t) = \text{Re}[D e^{i\omega t}]$$

1. Relate  $B_1$  &  $B_2$  to  $A$  &  $\phi$
2. Relate  $C$  to  $B_1$  &  $B_2$
3. Relate  $D$  to  $A$  &  $\phi$

Some useful relations:

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$e^{i\theta} = \cos \theta + i \sin \theta$$