

Exercise 10.1. Find the second time derivative of  $x$  in Eq. 10.9, and thereby show that it solves Eq. 10.8.

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We are given

$$-\omega^2 x = \ddot{x} \tag{10.8}$$

$$x = A \cos(\omega t) + B \sin(\omega t) \tag{10.9}$$

Hence

$$\ddot{x} = \frac{d^2}{dt^2}[A \cos(\omega t) + B \sin(\omega t)] = -A\omega^2 \cos(\omega t) - B\omega^2 \sin(\omega t) = -\omega^2 x$$