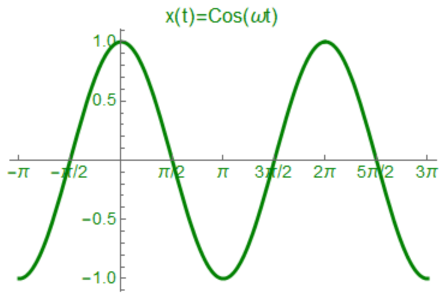
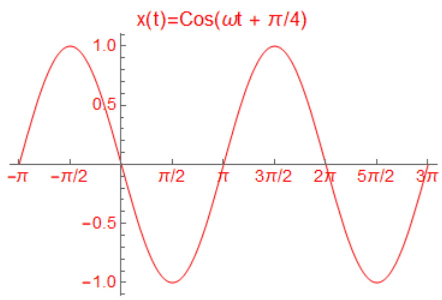
PHASE CONSTANTS

Harmonic oscillations are often described with sinusoidal functions. These can be the sine or cosine fuctions x(t) = Acos(ωt) or x(t) = Bsin(ωt) if the initial positions are A_{max} or zero. If the initial position is not A or zero, a linear sum such as x(t) = Acos(ωt) + Bsin(ωt), or use of a phase constant can adjust either function to any initial position. To see how this works, explore x(t) = ACos(ωt), x(t) = ACos(ωt + δ), and x(t) = ACos(ωt - δ).

The plot of x(t) = Acos(ωt) has x(t = 0) = A, that is, the function is maximum at t = 0.

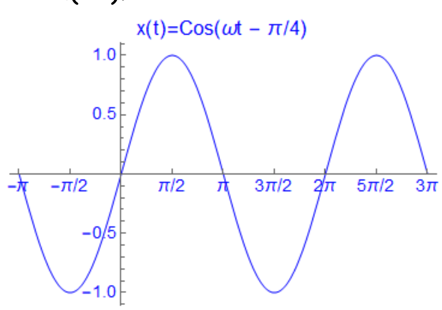


If a phase constant is added to the angle, x(t) = ACos(ωt + δ), it shifts the maximum back. Shown is ACos(ωt + π/4) so the maximum of the function is at -π/4 and x(t = 0) is zero.



Adding a phase constant shifts t = 0 axis to the right

If a phase constant is subtracted from the angle, x(t) = ACos(ωt - δ), it shifts the maximum forward. Shown is ACos(ωt - π/4) so the maximum of the function is at +π/4 and x(t = 0) is zero. This time, ACos(ωt - π/4) plots just like x(t) = ASin(ωt).



Subtracting a phase constant shifts t = 0 axis to the left