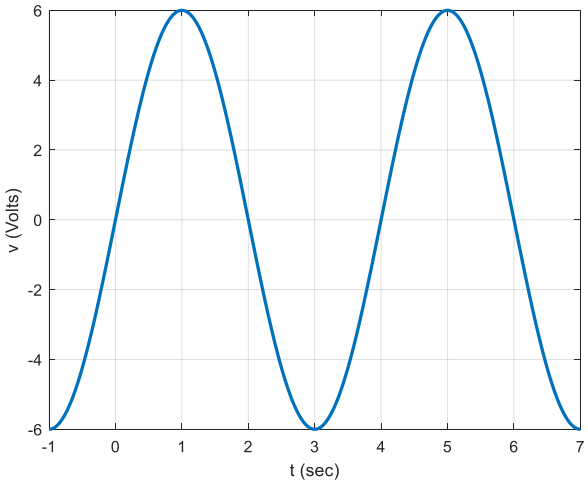
P1 Write an equation for the following sinusoid in terms of a cosine function, i.e. A cos(ωt + θ):



Don't forget units!

a) What is its period (in s)? Hint: between 2 s and 7 s.
   4 s between repetitions

b) What is its frequency (in Hz)? Hint: between 0.1 and 0.5 Hz.
   f = 1/T = ¼ Hz

c) What is its angular frequency (ω)? Hint: between 1 and 3.
   ω = 2πf = π/2 = 1.57 rad/s

d) What is its phase in degrees?
   looks like a sin, so -90°

e) Assuming it's a voltage waveform, what is its V_p? V_{pp}? V_{rms}?
   V_p = 6V, V_{pp}=12V, $V_{rms}=\frac{V_p}{\sqrt{2}}$ = 4.24 V_{rms}

f) What would be its output at t=1.5 sec? Hint: Verify your answer graphically, but use your function to derive a numerical value to 3 significant digits.
   From the above subparts, v(t) = Vp cos(ωt + θ) = 6 cos(3π/4 – 90°). Although this is the normal form used by EE's with phase in degrees, this has the first part, 3π/4, in radians and the second part, -90°, in degrees. Must convert both to the same and have the calculator in that same mode (radians or degrees) when evaluating the cosine function. Converting all to radians gives 6 cos(3π/4 – π/2) = 4.24V.

P2 Reduce the following expression to a single cosine with a phase angle noted in degrees in the range of (-180°≤θ≤180°). Hint: Magnitudes are always positive, and for this problem is a whole number; the phase of this problem should be negative.

6 cos(4t) - 8 sin(4t)

From class notes: A cos(ωt) + B sin(ωt) = C cos(ωt – θ)

C = $\sqrt{A^2 + B^2}$, θ = $\tan^{-1}$(B/A) {+180° if A < 0}

C = $\sqrt{6^2 + (-8)^2}$, θ = $\tan^{-1}$(-8/6)

C = 10, θ = -53.1°

10 cos(4t – 53.1°)