

## Assignment #01

1. Two voltage  $V_1$  ,  $V_2$  are in series connection and their resultant voltage is sum of these two aforementioned voltage. If  $V_1 = 8\cos(50t - \pi/3)\text{Volt}$  and  $V_2 = 15\cos(50t + 30^\circ)\text{Volt}$ . Find the resultant voltage  $V$ .

2. Adding two sinusoids of the same frequency but different amplitudes and phases results in another sinusoid (sin or cos) of same frequency. The resulting amplitude and phase are different from the amplitude, and phase of the two original sinusoids, as illustrated with the example below.

**Example 6-2:** Consider an electrical circuit with two elements  $R$  and  $L$  connected in series as shown in Fig. 6.15.

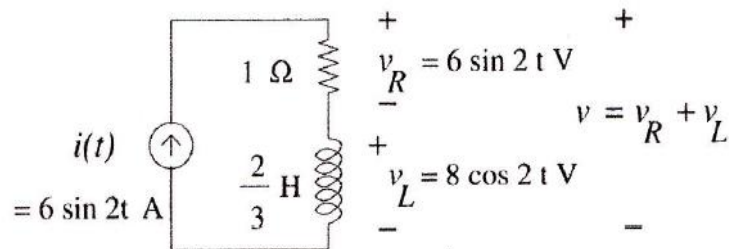


Figure 6.15: Addition of sinusoids in an RL circuit.

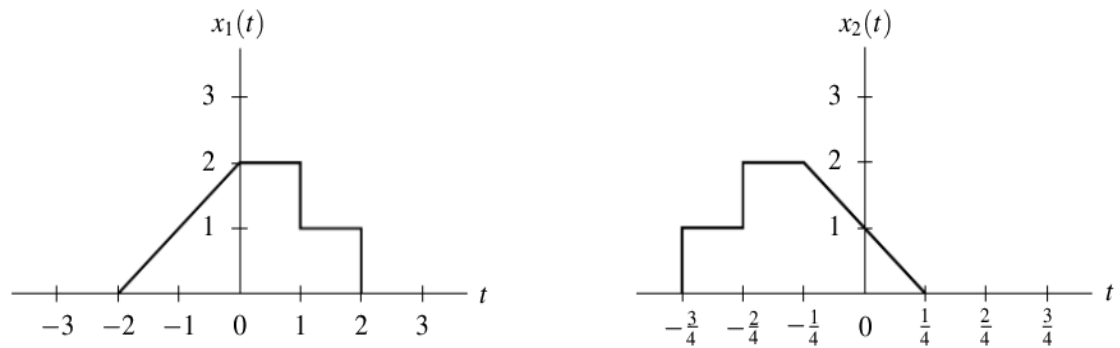
3. Find subtraction of the phasors  
 $13 \angle 35^\circ$  ,  $30 \angle -10^\circ$

4. Consider the signal  $x(t)$

The graph shows a signal  $x(t)$  plotted against time  $t$ . The signal is zero for  $t < -1$ . At  $t = -1$ , it jumps to 1 and decreases linearly to 0 at  $t = 0$ . From  $t = 0$ , it increases linearly to 1 at  $t = 2$ . At  $t = 2$ , it drops to -1 and remains constant until  $t = 4$ . At  $t = 4$ , it returns to 0.

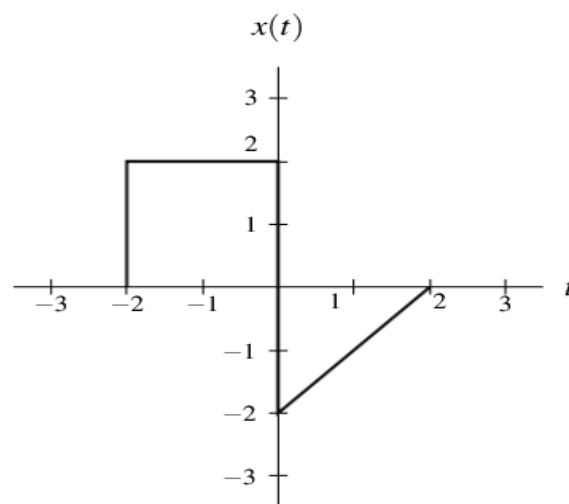
Sketch the signal  $y(t) = x(2t + 5)$

5. Given the functions  $x_1$  and  $x_2$  shown in the figures below, express  $x_2$  in terms of  $x_1$ .



6. Given the function  $x$  shown in the figure below, plot and label each of the following functions:

- (a)  $x(t - 1)$ ;
- (b)  $x(2t)$ ;
- (c)  $x(-t)$ ;
- (d)  $x(2t + 1)$ ; and
- (e)  $\frac{1}{4}x(-\frac{1}{2}t + 1) - \frac{1}{2}$ .

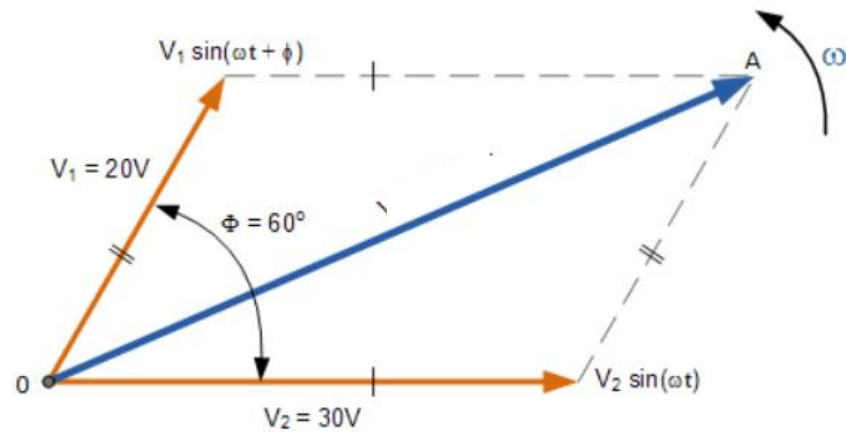


7. Express the instantaneous current given by  $I = 15 \sin(\omega t - \pi/3)$  in the polar and rectangular form.

8.  $A = 25\sin(\omega t - \pi/4)$  Volt and  $B = 10\cos(\omega t + 60^\circ)$

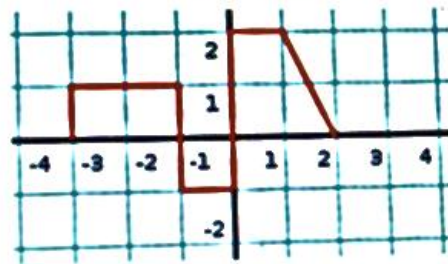
Find the product of given two entities.

9. Find the length of the diagonal



10.

Signal operations may occur in time-domain or in amplitude-domain. Time-domain operations include time-shifting, time-scaling, and time-reversing while amplitude-domain operations include amplitude-shifting, amplitude-scaling, and amplitude-reversing. Consider the signal  $x(t)$  below.



Sketch the following pairs side-by-side in rows and determine the operation(s) type(s) occurred:

(a)  $y_1(t) = x(t - 2)$  and  $y_2(t) = x(t) - 2$ .

(b)  $y_3(t) = x(2t)$  and  $y_4(t) = 2x(t)$ .