5) How long does it take a 10 kHz sine wave to complete 100 cycles?

$$\frac{1}{T} = f \qquad T = 1 \text{ cycle}$$

$$T_{100\ cycles} = T \times 100$$

$$\frac{1}{f} = T$$

$$\frac{1}{10^4} = T$$

$$10^{-4} = T$$

$$T_{100\ cycles} = 10^{-4} \times 10^{2}$$

$$\boxed{T_{100\ cycles} = 10^{-2}}$$

8) For the sine wave in Figure 11-77, determine the peak to peak, rms, average values.

Useful information

$V_p = 25\ V$

Objectives

~~25~~.

peak to peak voltage

rms ~~voltage~~ voltage

V_{avg}

$2V_p = V_{pp} = 2 \times 25 = \boxed{50\ V = V_{pp}}$

$\frac{V_p}{\sqrt{2}} = V_{rms} = \frac{25}{\sqrt{2}} = 17.678\ V$

$\boxed{V_{rms} = 17.7\ V}$

$\frac{2V_p}{\pi} = V_{avg}$

$V_{avg} = \frac{2 \times 25}{\pi} = 15.915\ V$

$\boxed{V_{avg} = 15.9\ V}$

13) Make a sketch of two sine waves as follows:

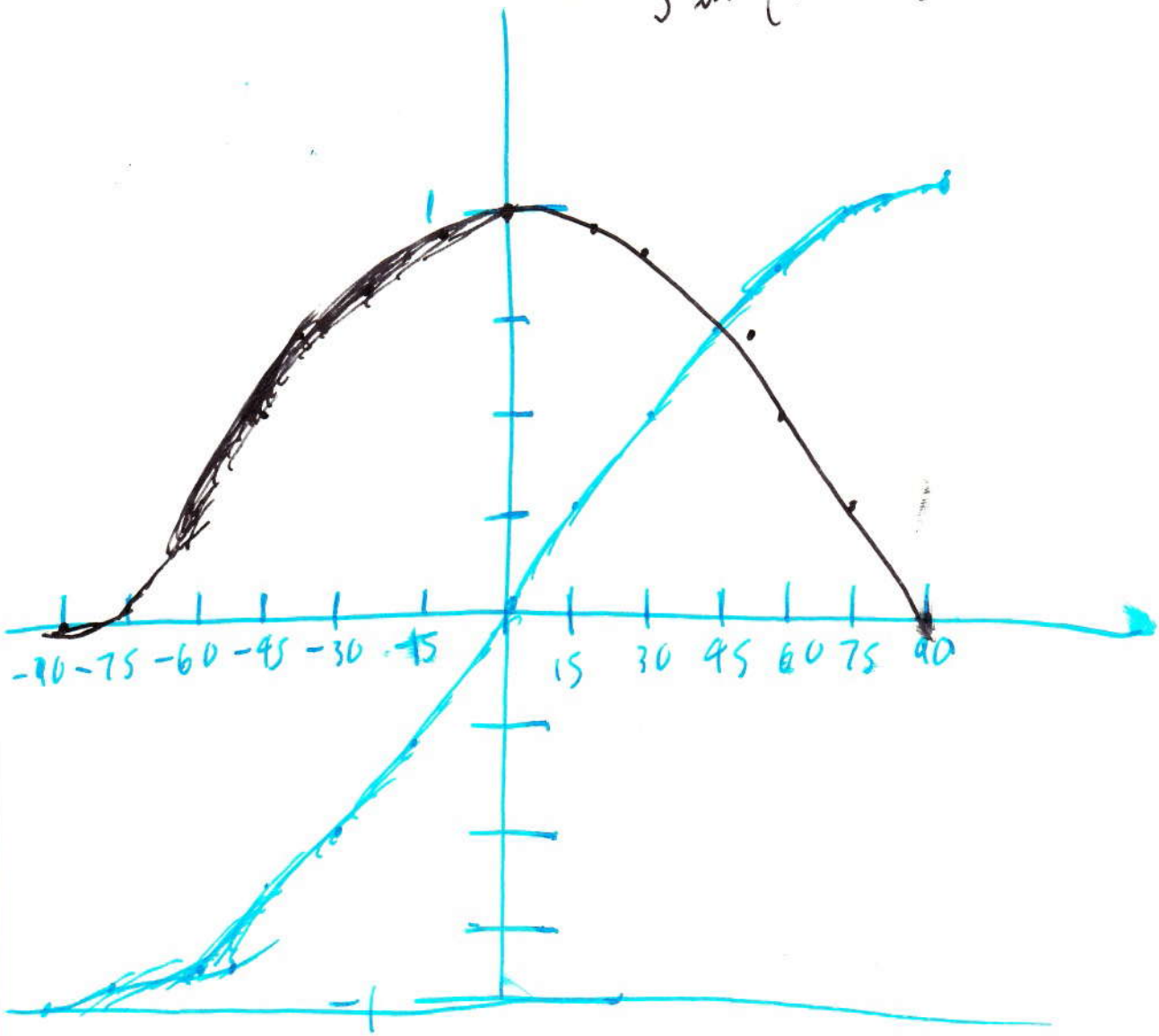
Sine wave A as reference.

Sine wave B lags A by 90°.

$\sin(\theta)$		$\sin(\theta+90)$		θ	
0	0	0.965	1	0	195 0
0.258	-0.258	0.866	0.965	15	210 -15
0.5	-0.5	0.707	0.866	30	225 -30
0.707	-0.707	0.5	0.707	45	240 -45
0.866	-0.866	0.258	0.5	60	255 -60
0.965	-0.965	0	0.258	75	285 -75
1	-1		0	90	-90
				105	300
				120	315
				135	330
				150	345
				165	360
				180	

$\sin(\theta + 0)$

$\sin(\theta + 90)$



14) b)

A certain sine wave has a positive going zero crossing at 0° and an rms value of 20 V Calculate its instantaneous value at each of the following angles.

b) = ~~V_{rms}~~ $V_p \sin(33°)$

h) = $V_p \sin(325°)$

$$V_{rms} = \frac{V_p}{\sqrt{2}}$$

$$V_{rms}\sqrt{2} = V_p$$

$$20\sqrt{2} = V_p = 28.284$$

$$28.3\ V = V_p$$

b) $V_{\sin(33)} = 15.4097V$

$V_{\sin(33)} = 15.4\ V$

h) $V_{\sin(325)} = -16.223V$

$V_{\sin(325)} = -16.2V$

20) Draw a phasor diagram to represent the sine waves in Figure 11-78 with respect to 0° as reference.

A) $1 \sin(-45°)$

b) $\frac{1}{2} \sin(-90°)$

a) $1 \angle -45°$

b) $0.5 \angle -90°$