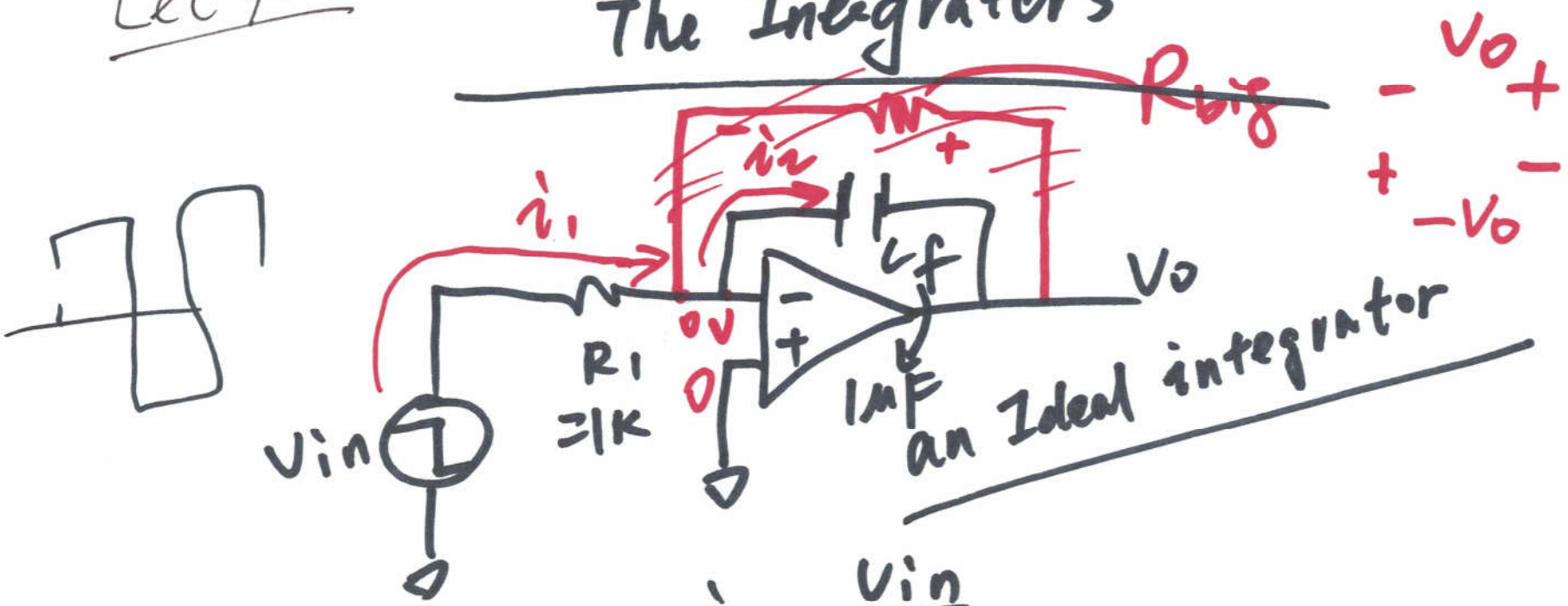
Lec 30

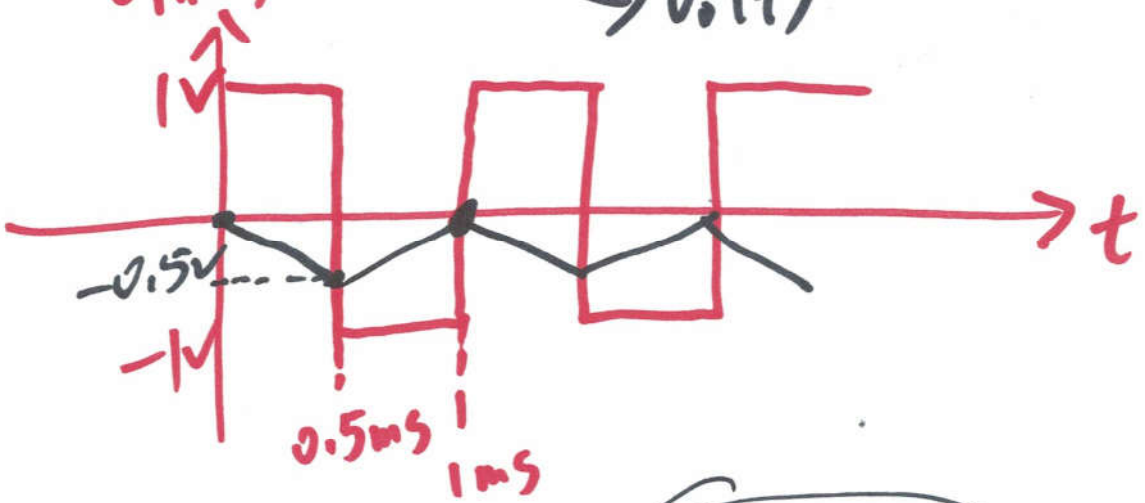
The Integrators



$$\begin{cases} i_1 = \dfrac{V_{in}}{R} \\ i_1 = i_2 \\ C\dfrac{d(-V_o)}{dt} = i_2 \end{cases}$$

$$-C\frac{dV_o(t)}{dt} = \frac{V_{in}(t)}{R}$$

$$\int_0^{V_o(t)} d(V_o(t)) = -\frac{1}{RC}\int V_{in}(t)\,dt$$

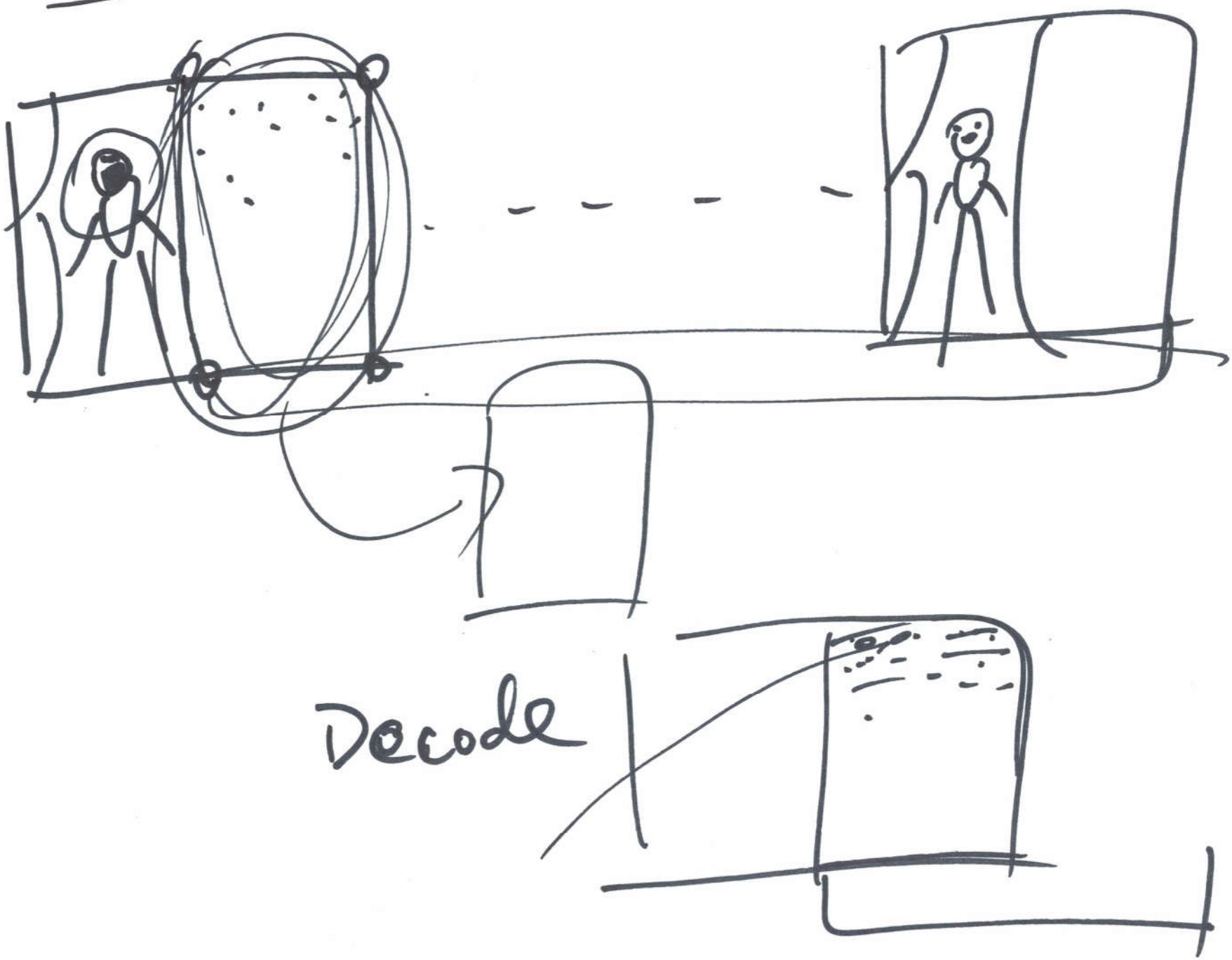


$$V_o(t) = -\frac{1}{RC}\int_0^{0.5ms} 1\,dt = -\frac{0.5m}{RC} = -\frac{0.5m\cdot}{1k\cdot 1mF} = -0.5V.$$

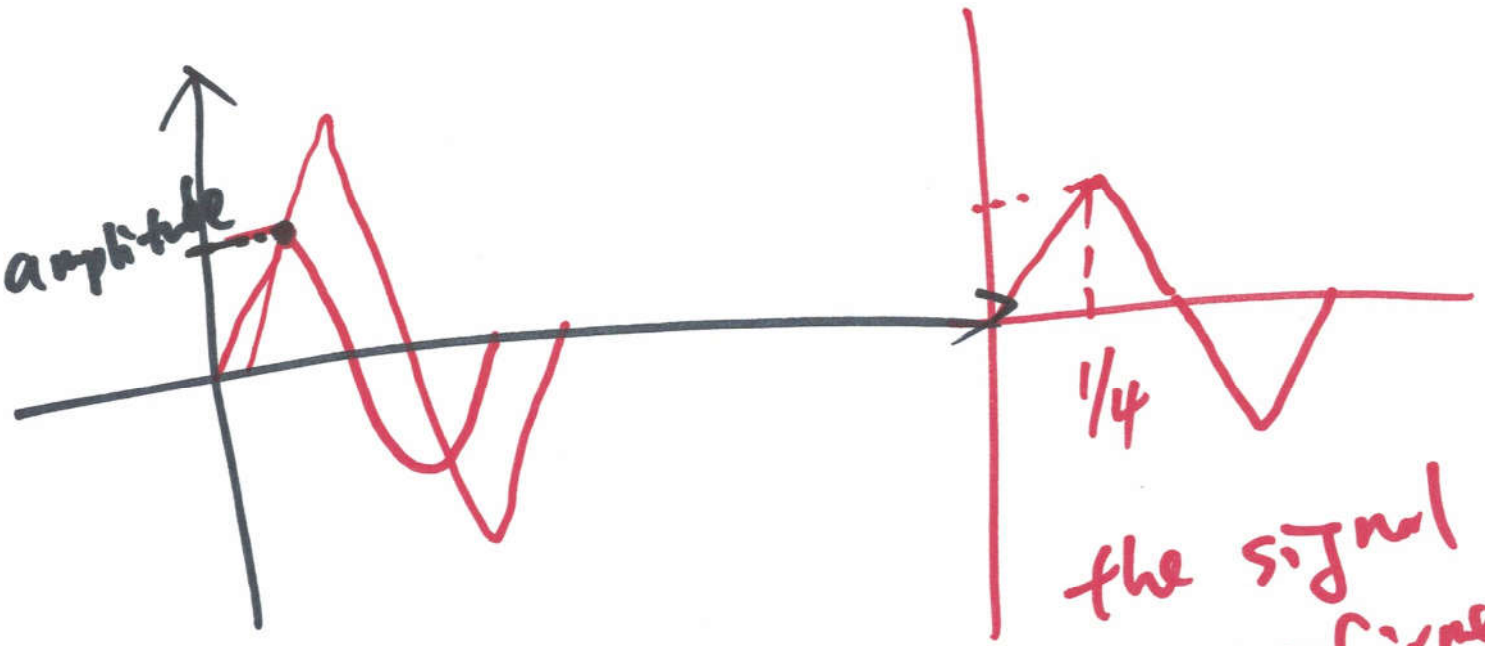
$$V_o(t) = -\frac{1}{RC}\int_{0.5ms}^{1ms} (-1)\,dt = +\frac{1}{RC}(1m - 0.5m) = \frac{0.5m}{RC} = 0.5^V$$

(2)

chapter 9 on the textbook



same concept in the signal systems,
we need
- Amplitude
- phase.

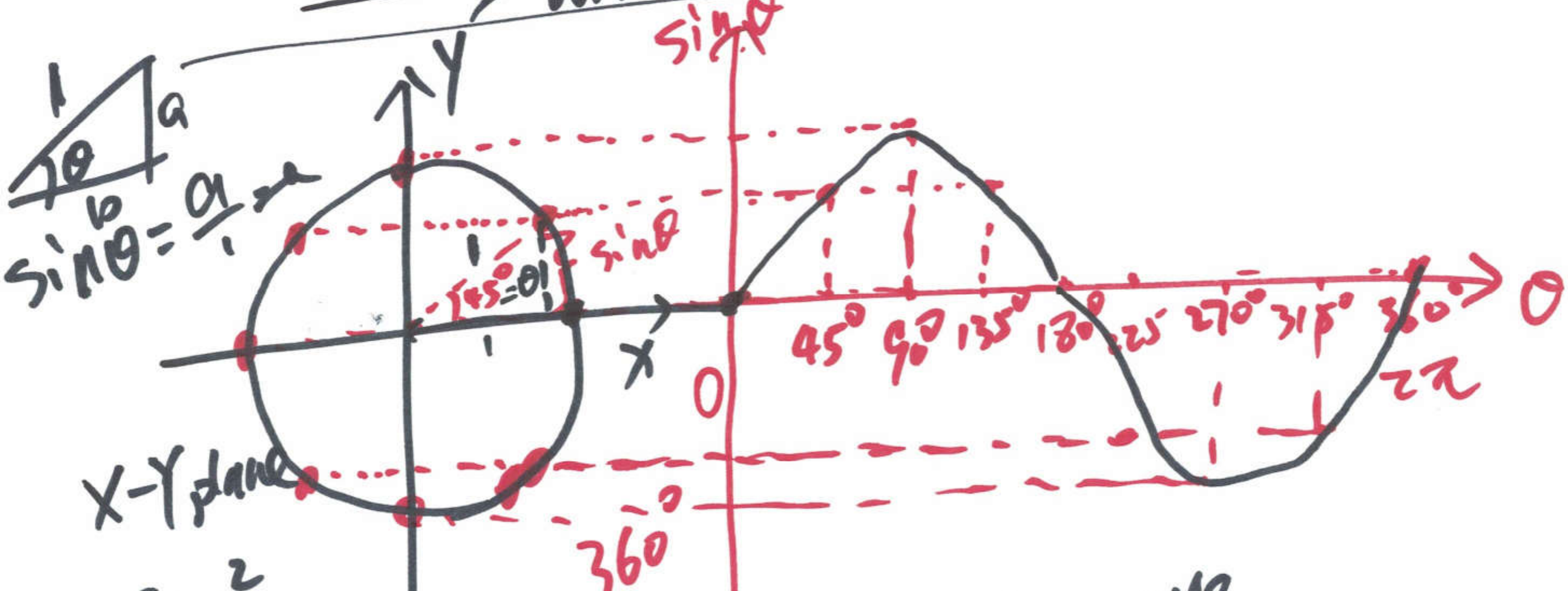


the signal is confirmed.

Sinewave → periodic → circle

↔

→ unit circle



$x^2+y^2=1^2$

unit circle

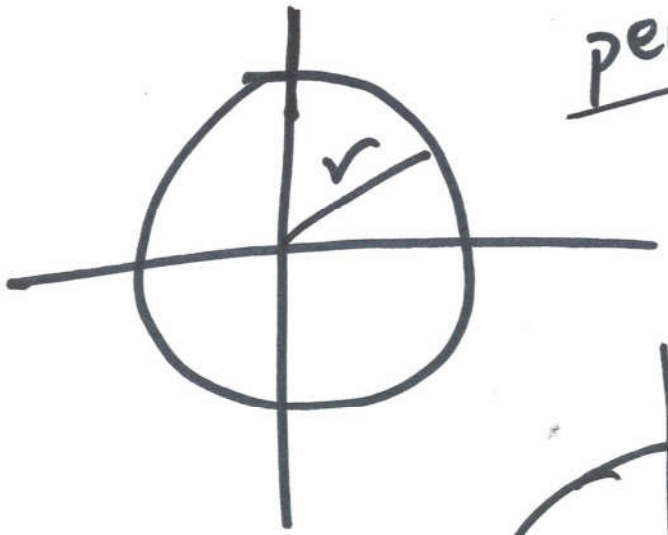
r=1

sinewave.

sin(ωt) sin(2πft)

⑤

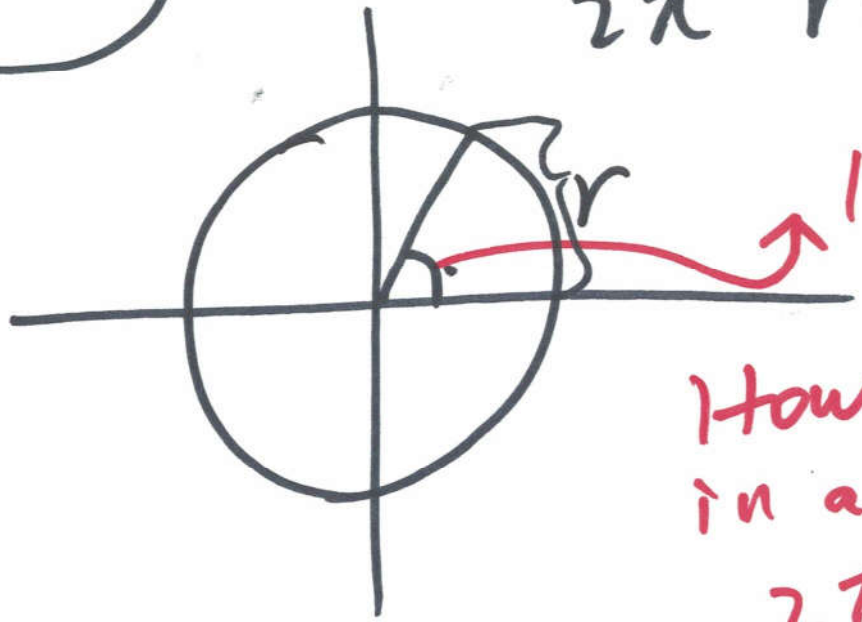
~~Sin(θ) =~~



perimeter: $2\pi r$

How many r's in a perimeter:

2π r's



1 radian for measuring angle.

How many radians in a circle?

2π

$$\sin\theta = \sin\left(2\pi \frac{1}{T} \cdot t\right)$$

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

$$= \sin(2\pi f t)$$

$$2\pi f = w \Longrightarrow \sin(wt)$$