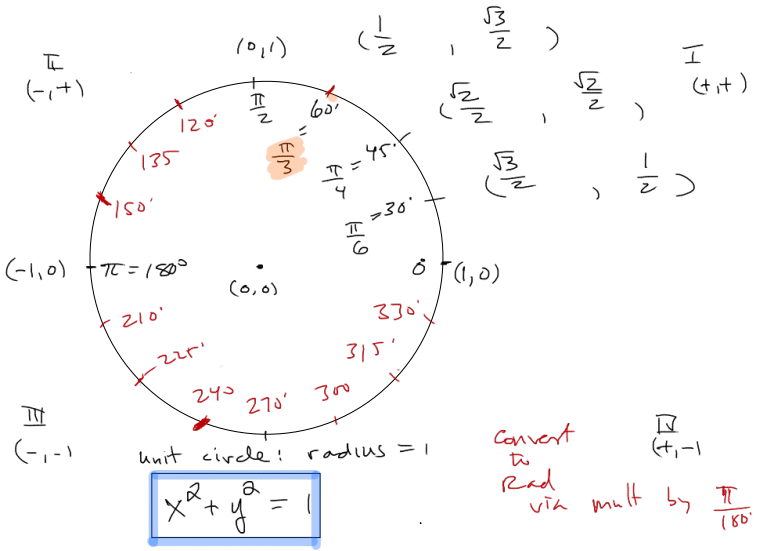
Thurs. Wk 1 ——— TRIG REVIEW ———



unit circle: radius = 1

$x^2 + y^2 = 1$

Convert to Rad via mult by $\frac{\pi}{180}$

Radian = length of arc on unit circle corresponding to the angle

sine & cosine def'n

$\sin(t)$ = y-coord for angle t

$\cos(t)$ = x-coord " "

$$\sin^2(t) + \cos^2(t) = 1$$

$$\csc(t) = \frac{1}{\sin(t)} \qquad \tan(t) = \frac{\sin(t)}{\cos(t)}$$

$$\sec(t) = \frac{1}{\cos(t)}$$

÷ Pythag. Trig Id by $\cos^2(t)$ ⟶ get...

$$\frac{\sin^2 t}{\cos^2 t} + \frac{\cos^2 t}{\cos^2 t} = \frac{1}{\cos^2 t} \Rightarrow \tan^2(t) + 1 = \sec^2(t)$$

$$\sin(x+y) = \sin x \cos y + \sin y \cos x$$

$$\cos(x+y) = \cos x \cos y - \sin x \sin y$$

Typical Trig Questions

① $\sin(2x) = \sin(x + x) = \sin x \cos x + \sin x \cos x = 2\sin x \cos x$

② $\cos(2x) = \cos x \cos x - \sin x \sin x = \cos^2 x - \sin^2 x$

③ Suppose angle θ is in QII and $\cos\theta = -.3$, determine all other (basic) trig functions of θ. Hint: use Pyth. Trig Id

$\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta + (-.3)^2 = 1$

$\sin\theta = \pm\sqrt{1 - (-0.3)^2}$

$= \pm\sqrt{1 - .09}$

$= \pm\sqrt{.91}$

(+) $\sin\theta = \sqrt{.91}$

$\text{rise/run} = \tan\theta = \frac{-\sin\theta}{\cos\theta} = \frac{-\sqrt{.91}}{.3} =$ (−)

$\sec\theta = \frac{1}{-0.3}$

$\csc\theta = \frac{1}{\sqrt{.91}}$

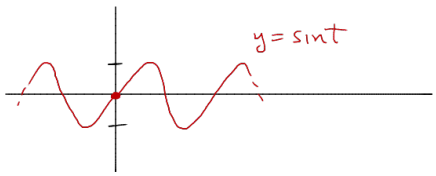
$\cot\theta = \frac{.3}{-\sqrt{.91}}$

TRIG MODELS

$d(t) = 12 + A \cdot \sin\left(\frac{2\pi}{365} t\right)$ models 6/22

length of day, for day t, w/ $t=0 \leftrightarrow$ 3/22

Produce a model for your hometown, compute $d\left(\frac{365}{2}\right)$ "length of day on 9/22"



3/22 — 6/22 — 9/22 — 12/22

First get A w/ your datapoint:

15hr 36 min $\leftrightarrow$ 15.5 hr $= d\left(\frac{365}{4}\right)$

$15.5 = 12 + A \cdot \sin\left(\frac{2\pi}{365} \cdot \frac{365}{4}\right)$

$= 12 + A \sin\left(\frac{\pi}{2}\right) = 12 + A$

$3.5 = 15.5 - 12 = A$ $\Rightarrow$ $d(t) = 12 + 3.5 \sin\left(\frac{2\pi}{365} t\right)$

$d\left(\frac{365}{2}\right) = 12 + 3.5 \sin\left(\frac{2\pi}{365} \cdot \frac{365}{2}\right) = 12$

$= 12 + 3.5 \cdot \underbrace{\sin \pi}_{0}$

$= 12$