

MATH 191 FINAL EXAM

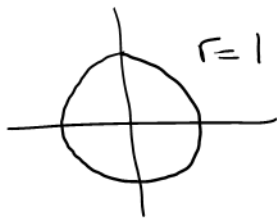
Sat Dec 16

9am - noon

TEC 174

27.1 Review: Trig Functions

① Radians: arc length around the unit circle.



$$\text{Circumference} = 2\pi r = 2\pi$$

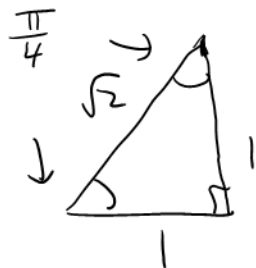
$$2\pi \text{ radians} = 360^\circ$$

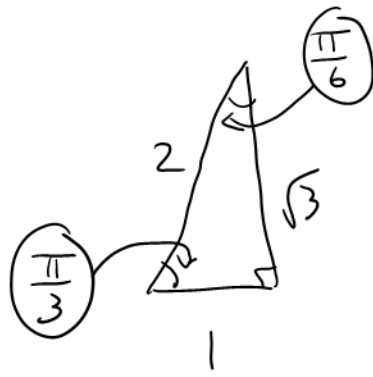
$$\boxed{\pi \text{ radians} = 180^\circ}$$

$$30^\circ = 30^\circ \times \frac{\pi}{180^\circ} = \frac{\pi}{6}$$

$$\frac{\pi}{4} = \frac{\pi}{4} \times \frac{180^\circ}{\pi} = 45^\circ$$

②





③ SOHCAHTOA

$$\sin \frac{\pi}{6} = \frac{O}{H} = \frac{1}{2}$$

$$\cos \frac{\pi}{6} = \frac{A}{H} = \frac{\sqrt{3}}{2}$$

$$\tan \frac{\pi}{6} = \frac{O}{A} = \frac{1}{\sqrt{3}}$$

④

$$\csc x = \frac{1}{\sin x}$$

$$\sec x = \frac{1}{\cos x}$$

$$\cot x = \frac{1}{\tan x}$$

$$\csc \frac{\pi}{6} = \frac{2}{1}$$

$$\sec \frac{\pi}{6} = \frac{2}{\sqrt{3}}$$

$$\cot \frac{\pi}{6} = \frac{\sqrt{3}}{1}$$

⑤ CAST Rule

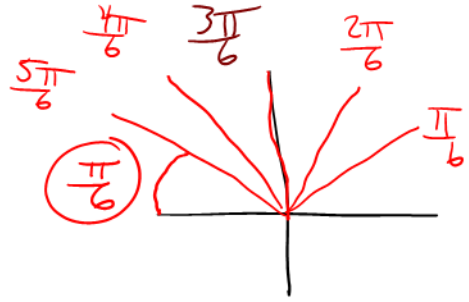
S	A
T	C

$\sin \theta > 0$ ($\cos \theta < 0, \tan \theta < 0$)	All of $\sin \theta, \cos \theta, \tan \theta > 0$
$\tan \theta > 0$	$\cos \theta > 0$

$$\cos\left(\frac{5\pi}{6}\right)$$

$$= -\cos\left(\frac{\pi}{6}\right)$$

Draw a reference angle
to x-axis



CAST
Rule

$$= -\frac{\sqrt{3}}{2}$$

⑥ $\sin^2 x$ means $[\sin x]^2$

$$\tan^2 \frac{\pi}{6} = \left[\tan \frac{\pi}{6}\right]^2$$

$$= \left[\frac{1}{\sqrt{3}}\right]^2$$

$$= \frac{1}{3}$$

⑦ $\tan x = \frac{\sin x}{\cos x}$ $\cot x = \frac{\cos x}{\sin x}$

⑧ $\sin^2 x + \cos^2 x = 1$

$\div \sin^2 x$: $1 + \frac{\cos^2 x}{\sin^2 x} = \frac{1}{\sin^2 x}$

$$1 + \cot^2 x = \csc^2 x$$

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

$$\div \cos^2 x$$

...

$$\boxed{\tan^2 x + 1 = \sec^2 x}$$

⑨ Ex: Round to 2 decimal places

a) $\sin 60^\circ \approx 0.87$ (Degree Mode)

b) $\sin \frac{\pi}{3} \approx 0.87$ (Radian Mode)

c) $f(x) = e^x + \sin x$

Find $f(30^\circ)$

$$f(30^\circ) = f\left(\frac{\pi}{6}\right)$$

$$= e^{\frac{\pi}{6}} + \sin \frac{\pi}{6}$$

$$= e^{\left(\frac{\pi}{6}\right)} + \sin\left(\frac{\pi}{6}\right)$$

Radian Mode

$$\approx 2.19$$