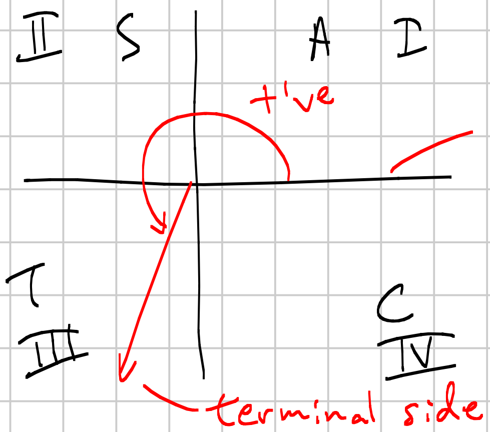
PreCalc 12 Final Review Chp 6

Note Title 2016-05-27

6.1) Trig in Standard Position

S $^o/_h$ C $^a/_h$ T $^o/_a$ ⇒ S $^y/_r$ C $^x/_r$ T $^y/_x$



When terminal sides line up, we say they are co-terminal $\pm 360°n$, or $\pm 2\pi n$, $n \in \mathbb{Z}$

Pythagoras to determine missing side: $r = \sqrt{x^2+y^2}$ $x = \sqrt{r^2-y^2}$ $y = \sqrt{r^2-x^2}$

Use ASTC to determine sign of x & y, r is always positive.

On unit circle $(r=1)$:

$y = \sin\theta$

$x = \cos\theta$

$\tan\theta = y/x = $ slope

Non-unit circle:

$y = r\sin\theta$

$x = r\cos\theta$

Reciprocal Trig:

$\csc\theta = 1/\sin\theta = r/y$

$\sec\theta = 1/\cos\theta = r/x$

$\cot\theta = 1/\tan\theta = x/y$

Reference Angles: (use prime notation ')

$0° \le \theta \le 90°$ or $0 \le \theta \le \pi/2$

I: $\theta = \theta'$ $\theta' = \theta$

II: $\theta = 180° - \theta'$ $\theta' = 180° - \theta$

III: $\theta = 180° + \theta'$ $\theta' = \theta - 180°$

IV: $\theta = 360° - \theta'$ $\theta' = 360° - \theta$

for radians

$180° = \pi$

$360° = 2\pi$

Solving trig with bx. Find $(bx)'$ & solve ASTC quadrants, the divide all answers by 'b'.

eg) Solve $\sin 3x = -1/2$

$(3x)' = \sin^{-1}(1/2) = \pi/6$

III

$3x_1 = \pi + \pi/6$

$3x_1 = 7\pi/6$

$\boxed{x_1 = 7\pi/18}$

$x = 7\pi/18$

IV

$3x_2 = 2\pi - \pi/6$

$3x_2 = 11\pi/6$

$\boxed{x_2 = 11\pi/18}$

wrong: $x_2 = 2\pi - 7\pi/18 = 29\pi/18$

6.2) Arclength $\theta = s/r$ $s = |r\theta|$ $r = s/\theta$ (has to be radians) don't forget units

$$\text{degrees} = \frac{180^\circ \cdot \text{radians}}{\pi} \qquad \text{radians} = \frac{\pi \cdot \text{degrees}}{180^\circ}$$

State general solutions use Principal Angles.
(unless told otherwise): $0^\circ \leq \theta < 360^\circ$ $0 \leq \theta < 2\pi$
or just think smallest positive coterminal angle.

6.3) Special Angles

Reference		$\sin\theta$	$\cos\theta$	$\tan\theta$
0°	0	0	1	0
30°	$\pi/6$	$1/2$	$\sqrt{3}/2$	$1/\sqrt{3}$
45°	$\pi/4$	$1/\sqrt{2}$	$1/\sqrt{2}$	1
60°	$\pi/3$	$\sqrt{3}/2$	$1/2$	$\sqrt{3}$
90°	$\pi/2$	1	0	undef.

Check mode on calculator. deg<-> rad. Answer in radians if it doesn't say degrees.

Area of sector: $A = \frac{\theta}{2\pi}(\pi r^2) = \frac{\theta}{360^\circ}(\pi r^2)$
radians

Angular velocity: $V_a = \frac{\Delta\theta}{t}$ change of θ distance $= V_a r t$.

Revolution: 1 rev = 2π radians

6.4) Inverse Trig - do on |ratio| - gives reference angle, θ'
then determine quadrant and calc θ.
Period - length of cycle to repeat: $\sin\theta$ & $\cos\theta$ - $2\pi/b$
$\tan\theta$ - π/b

6.5) Properties - centerline: $d = \frac{\min + \max}{2}$
$y = af(b(x-c)) + d$ amplitude: $a = \frac{\max - \min}{2} = \max - \text{centerline}$
phase shift (c): - measure c.l. going up for sine
from y-axis - measure max for cosine

6.6) Graphing: Draw dotted centerline, max, min.
Draw point for max phase shifted with cosine
" c.l. going up phase shifted with sine
Draw points for cycles using the period
Draw cycles.

6.7) Word Problems:

radius $\equiv$ amplitude

diameter $\equiv$ 2(amplitude) $\equiv$ peak − valley $\equiv$ max − min

revolution $\equiv$ full circle $\equiv$ cycle $\equiv$ 360° $\equiv$ 2π rads

min $\equiv$ low $\equiv$ least $\equiv$ valley

max $\equiv$ high $\equiv$ most $\equiv$ peak

centerline $\equiv$ mean $\equiv$ avg $\equiv$ center $\equiv$ middle $\equiv$ axle height