Pre-Calculus 11 Angles in Standard Position…again

Examples

not on the unit circle

1. The point P(-5, 12) is on the terminal arm of an angle θ in standard position.

   a) Determine the distance r from the origin to P.

   II   Sin
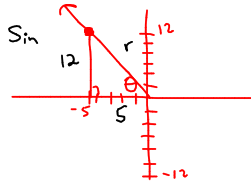
   $$x^2 + y^2 = r^2$$
   $$5^2 + 12^2 = r^2$$
   $$169 = r^2$$
   $$13 = r \quad \text{← radius is always +ve}$$
   $$(5, 12, 13 \text{ triplet})$$

   b) Determine the primary trigonometric ratios of θ.

   $\sin \theta > 0$
   $\cos \theta < 0$
   $\tan \theta < 0$

   $$\cos \theta = \frac{-5}{13}$$

   Use SOH CAH TOA

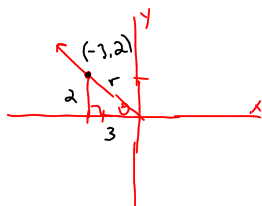 $$\sin \theta = \frac{12}{13}$$

   $$\tan \theta = \frac{-12}{5}$$

   c) Determine the measure of θ to the nearest degree.

   $$\theta = \cos^{-1}\left(\frac{-5}{13}\right)$$
   $$= 112.62°$$

2. P(x, y) is a point on the terminal side of angle θ in standard position. Determine $\sin\theta$, $\cos\theta$, and $\tan\theta$ for the following points.
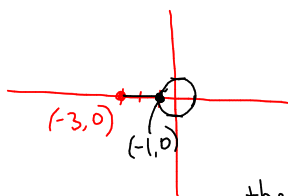
a) $(-3, 2)$

$x^2 + y^2 = r^2$

$3^2 + 2^2 = r^2$

$13 = r^2$

$\pm\sqrt{13} = r$

$r > 0$

$\therefore r = \sqrt{13}$

in Q II

$\sin\theta > 0$

$\cos\theta < 0$

$\tan\theta < 0$

$\sin\theta = \frac{2}{\sqrt{13}}$ or $\frac{2\sqrt{13}}{13}$

$\cos\theta = -\frac{3}{\sqrt{13}}$ or $\frac{-3\sqrt{13}}{13}$

$\tan\theta = \frac{-2}{3}$

b) $(-3, 0)$

on the unit circle
recall:

$\cos\theta = x$

$\sin\theta = y$

$\tan\theta = \frac{y}{x}$

$(-1, 0)$ ← x y

$\cos\theta = -1$

$\sin\theta = 0$

$\tan\theta = \frac{0}{-1}$

$= 0$

.

3. Determine the exact primary trigonometric ratios for each angle in standard position.

a) 120°   b) 270°
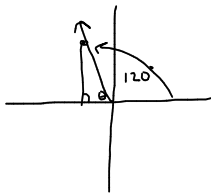
on calc
$$\cos 120° = -\tfrac{1}{2}$$

on unit circle $r = 1$

$$x^2 + y^2 = 1^2$$
$$(-\tfrac{1}{2})^2 + y^2 = 1^2$$
$$y^2 = 1 - \tfrac{1}{4}$$
$$y^2 = \tfrac{3}{4}$$
$$y = \pm \tfrac{\sqrt{3}}{2}$$

$$\sin 120° = \tfrac{\sqrt{3}}{2}$$

$$\tan 120° = \frac{\tfrac{\sqrt{3}}{2}}{-\tfrac{1}{2}} = -\sqrt{3}$$

(0, -1)
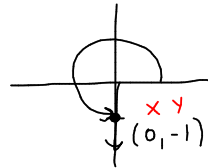
$$\cos 270° = 0 \quad (x)$$
$$\sin 270° = -1 \quad (y)$$
$$\tan 270° = \frac{-1}{0} \quad (\tfrac{y}{x})$$
undefined

4. Determine possible coordinates of a terminal point for each angle in standard position.

a) 135°   b) 300°

$$\cos 300° = \tfrac{1}{2}$$

(from calc)

$$\sin \theta = \pm \tfrac{\sqrt{3}}{2}$$
$$\sin 300° = -\tfrac{\sqrt{3}}{2}$$

$$\tan 300° = -\sqrt{3}$$

Assignment: pg. 450; #7, 9, 14, 15 pg. 462; #5, 7a

pg. 432 #4, 8   pg 450 #6, 10b