$\dfrac{S|A}{T|C}$ SOH CAH TOA
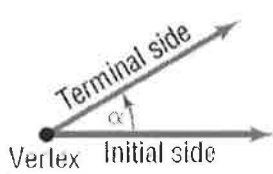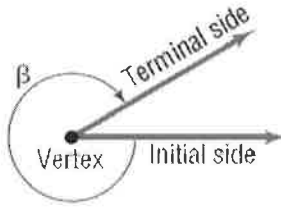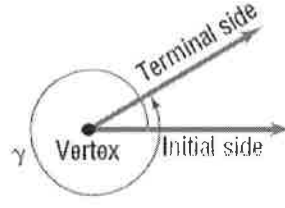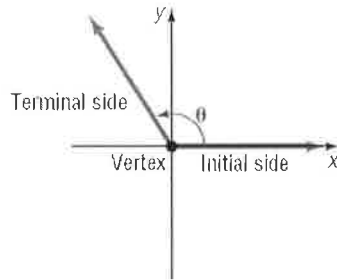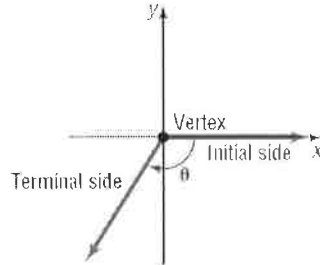

Counterclockwise rotation

Positive angle

Clockwise rotation

Negative angle

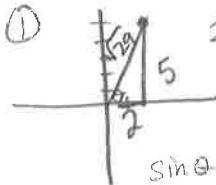Counterclockwise rotation

Positive angle

(a) θ is in standard position; θ is positive

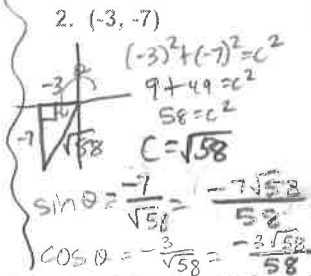**(b)** θ is in standard position; θ is negative

Standard position means the initial side is on the positive x-axis!

The terminal side of angle θ in standard position passes through the given point. Find sin θ, cos θ, and tan θ in simplified form.

① 1. (2, 5)

$2^2 + 5^2 = c^2$
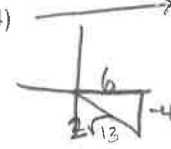$29 = c^2$
$c = \sqrt{29}$

$\sin\theta = \dfrac{5}{\sqrt{29}} = \dfrac{5\sqrt{29}}{29}$

$\cos\theta = \dfrac{2}{\sqrt{29}} = \dfrac{2\sqrt{29}}{29}$
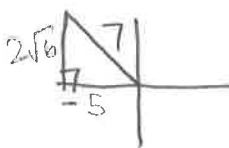
$\tan\theta = \dfrac{5}{2}$

2. (-3, -7)

$(-3)^2 + (-7)^2 = c^2$
$9 + 49 = c^2$
$58 = c^2$
$c = \sqrt{58}$

$\sin\theta = \dfrac{-7}{\sqrt{58}} = \dfrac{-7\sqrt{58}}{58}$

$\cos\theta = \dfrac{-3}{\sqrt{58}} = \dfrac{-3\sqrt{58}}{58}$

$\tan\theta = \dfrac{-7}{-3} = \dfrac{7}{3}$

3. (6, -4)

$6^2 + (-4)^2 = c^2$
$36 + 16 = c^2$
$52 = c^2$
$c = 2\sqrt{13}$

$\sin\theta = \dfrac{-4}{2\sqrt{13}} = \dfrac{-2}{\sqrt{13}} = \dfrac{-2\sqrt{13}}{13}$

$\cos\theta = \dfrac{6}{2\sqrt{13}} = \dfrac{3}{\sqrt{13}} = \dfrac{3\sqrt{13}}{13}$

$\tan\theta = \dfrac{-4}{6} = \dfrac{-2}{3}$

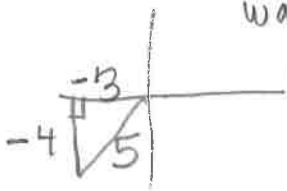θ is the measure of an angle in standard position that lies in the given quadrant. Find the required trig function.

4. $\cos\theta = -\dfrac{5}{7}$, *quad II*, *find* $\sin\theta$

$(-5)^2 + b^2 = 7^2$
$25 + b^2 = 49$ $b = 2\sqrt{6}$
$b^2 = 24$

$\sin\theta = \dfrac{2\sqrt{6}}{7}$

5. $\tan\theta = \dfrac{4}{3}$, *quad III*, *find* $\cos\theta$

watch +/- signs on legs of △

$\cos\theta = \dfrac{-3}{5}$

$$\begin{array}{c|c}
\begin{array}{c}\sin + \\ \csc \text{ are } + \\ S\end{array} & \begin{array}{c}\text{all} \\ \text{are } + \\ A\end{array} \\
\hline
\begin{array}{c}\tan + \\ \cot \text{ are } + \\ T\end{array} & \begin{array}{c}C \\ \cos + \sec \\ \text{are } +\end{array}
\end{array}$$

Given the values of two trig functions, state the quadrant(s) in which the angle lies.

6. $\sin\theta = -\dfrac{12}{13}, \quad \sec\theta = \dfrac{13}{5}$

Sin is − in III   sec is + in I
            IV   + IV

So ⟨IV⟩

7. $\sin\theta = \dfrac{7}{16}, \quad \cos\theta = -\dfrac{\sqrt{207}}{16}$

Sin is +
in I + II

cos is − in II + III

So the one in common is ⟨II⟩

8. $\tan\theta = -\dfrac{9}{5}, \quad \cot\theta = -\dfrac{5}{9}$

tan is −
in II + IV

cot is −
in II + IV

Same, so give both answers

⟨II + IV⟩