$\sin\theta$ if $\theta \to Q3$ given

$-$ $\qquad \tan\theta = \frac{2}{5}$

S	A
T	C

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

$$1 + \tan^2\theta = \sec^2\theta$$

$$1 + \left(\frac{2}{5}\right)^2 = \sec^2\theta$$

$$\frac{25}{25} + \frac{4}{25} = \sec^2\theta$$

$$\pm\sqrt{\frac{29}{25}} = \sqrt{\sec^2\theta}$$

$$\pm\frac{\sqrt{29}}{5} = \sec\theta$$

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

$$\cos\theta = \frac{5}{\sqrt{29}} = \boxed{\pm\frac{5\sqrt{29}}{29}}$$

$$\tan\theta = \boxed{\frac{2}{5}}$$

$$\sin\theta =$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

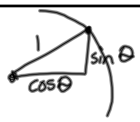
$$\pm\frac{\cancel{5}\sqrt{29}}{29} \cdot \frac{2}{\cancel{5}} = \frac{\sin\theta}{\cancel{\pm\frac{5\sqrt{29}}{29}}} \cancel{\pm\frac{5\sqrt{29}}{29}}$$

$$\boxed{-\frac{2\sqrt{29}}{29}} = \sin\theta$$

$$\cancel{\sqrt{}}x^2 = 4$$

$$x = \pm 2$$

$$\frac{\sin^2\theta}{c^2 s^2} + \frac{\cos^2\theta}{c^2 s^2} = \frac{1}{c^2 s^2}$$



$*\tan\theta = \frac{\sin\theta}{\cos\theta}$

$1 + \tan^2\theta = \sec^2\theta$

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

Ex: Use a Pythagorean identity to find $\boxed{\tan\theta}$ if θ is in quadrant I, given

$\sin\theta = \frac{5\sqrt{31}}{31}$ (+)

II S	A I
III T	C IV

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

$\left(\frac{5\sqrt{31}}{31}\right)^2 + \cos^2\theta = 1$

$\frac{25\cdot\cancel{31}}{31\cdot\cancel{31}} + \cos^2\theta = \frac{31}{31}$

$-\frac{25}{31} \qquad\qquad -\frac{25}{31}$

$\cos^2\theta = \frac{6}{31}$

$\cos\theta = \frac{\sqrt{6}}{\sqrt{31}} \cdot \frac{\sqrt{31}}{\sqrt{31}} = \frac{\sqrt{186}}{31}$

$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{5\sqrt{31}}{\cancel{31}}}{\frac{\sqrt{186}}{\cancel{31}}} = \frac{5\sqrt{31}}{\sqrt{186}} = \frac{5\cancel{\sqrt{31}}}{\sqrt{6}\cancel{\sqrt{31}}}$

$\frac{\frac{1}{\cancel{31}}}{\frac{1}{\cancel{31}}} = 1$

$= \frac{5\sqrt{31}}{\cancel{31}} \cdot \frac{\cancel{31}}{\sqrt{186}} = \frac{5\sqrt{31}}{\sqrt{186}}$

$\tan\theta = \frac{5}{\sqrt{6}} = \boxed{\frac{5\sqrt{6}}{6}}$

$\sin\theta \; \frac{5\sqrt{31}}{31} \quad \tan\theta$

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

$1 + \cot^2\theta = \left(\frac{31}{5\sqrt{31}}\right)^2 \qquad \frac{31\cdot\cancel{31}}{5\cdot5\cdot\cancel{31}}$

$\frac{25}{25} + \cot^2\theta = \frac{31}{25}$

$-\frac{25}{25} \qquad\qquad -\frac{25}{25}$

$\cot^2\theta = \frac{6}{25}$

$\cot\theta = \frac{\sqrt{6}}{5}$

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

$\tan\theta = \frac{5}{\sqrt{6}} = \frac{5\sqrt{6}}{6}$

Feb 26-8:29 AM

Find sin θ θ is in Q2, given

+ $\cos\theta = -\frac{3}{5}$

$\boxed{S}$	A
T	C

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

$$\sin^2\theta + \left(-\frac{3}{5}\right)^2 = 1$$

$$\sin^2\theta + \frac{9}{25} = \frac{25}{25}$$

$$-\frac{9}{25} \quad -\frac{9}{25}$$

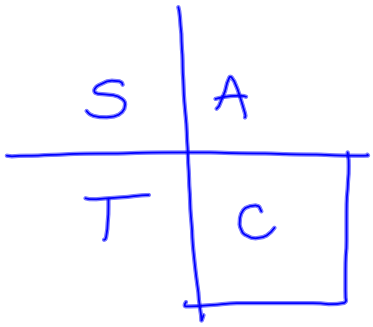
$$\sin^2\theta = \frac{16}{25}$$

$$\sin\theta = \frac{4}{5}$$

Feb 26-8:43 AM

C. $\cos\theta$ if θ is in Q4

+ $\tan\theta = \dfrac{-4\sqrt{2}}{7}$



$$1 + \tan^2\theta = \sec^2\theta$$

$$1 + \left(\frac{-4\sqrt{2}}{7}\right)^2 = \sec^2\theta \qquad 16 \cdot 2$$

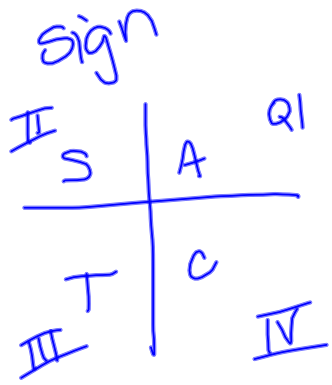
$$\frac{49}{49} + \frac{32}{49} = \sec^2\theta$$

$$\frac{81}{49} = \sec^2\theta$$

$$\frac{9}{7} = \sec\theta \rightarrow \frac{\sec\theta}{1}$$

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

$$\cos\theta = \boxed{\frac{7}{9}}$$



$\cos\theta$, Q I $\quad$ +

$$\sin\theta = \frac{3\sqrt{34}}{34}$$

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

$$\left(\frac{3\sqrt{34}}{34}\right)^2 + \cos^2\theta = 1$$

$$\frac{9\cdot\cancel{34}}{34\cdot\cancel{34}}$$

$$\frac{9}{34} + \cos^2\theta = \frac{34}{34}$$

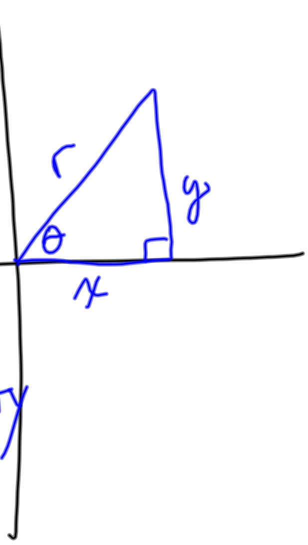
$$-\frac{9}{34} \qquad\qquad -\frac{9}{34}$$

$$\cos^2\theta = \frac{25}{34}$$

$$\cos\theta = \frac{5}{\sqrt{34}} = \boxed{\frac{5\sqrt{34}}{34}}$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{3\cancel{\sqrt{34}}}{\cancel{34}}}{\frac{5\cancel{\sqrt{34}}}{\cancel{34}}} = \boxed{\frac{3}{5}}$$

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



① $\dfrac{x^2}{r^2} + \dfrac{y^2}{r^2} = \dfrac{r^2}{r^2}$ divide both sides of the Pythagorean Theorem by r^2

② $\left(\dfrac{x}{r}\right)^2 + \left(\dfrac{y}{r}\right)^2 = 1$ Power of a quotient property

③ $\sin\theta = \dfrac{y}{r}$ $\cos\theta = \dfrac{x}{r}$

Substitute $\cos\theta$ for $\frac{x}{r}$ and $\sin\theta$ for $\frac{y}{r}$

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

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

Find $\tan\theta$ if θ is in QI, given

$$\sin\theta = \frac{11}{13}$$

S	A
T	C

$+$

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

$$\left(\frac{11}{13}\right)^2 + \cos^2\theta = 1$$

$$\frac{121}{169} + \cos^2\theta = \frac{169}{169}$$

$$-\frac{121}{169} \qquad\qquad -\frac{121}{169}$$

$$\cos^2\theta = \frac{48}{169}$$

$$\cos\theta = \frac{4\sqrt{3}}{13}$$

$\sqrt{48}$
2 24
2 12
2 6
2 3

$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{11}{\cancel{13}}}{\frac{4\sqrt{3}}{\cancel{13}}} = \frac{11}{4\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}$$

$4\cdot 3$

$$\boxed{\frac{11\sqrt{3}}{12}}$$