Pre Calc 4.4 Circuit

① If $\sec\theta = -\frac{9}{4}$ in Quad III, find $\tan\theta$

$\sec\theta = \frac{r}{x}$

$r = \sqrt{x^2+y^2}$

$9 = \sqrt{(-4)^2+y^2}$

$x = -4 \quad y = -\sqrt{65} \quad r = 9$

$81 = 16 + y^2$

$65 = y^2$

$y = -\sqrt{65} \quad \leftarrow y \text{ is neg. in Quad III}$

$\tan\theta = \frac{y}{x} = \frac{-\sqrt{65}}{-4} = \boxed{\frac{\sqrt{65}}{4}}$

② If $\cos\theta = \frac{5}{8}$ and $\sin\theta > 0$, find $\sec\theta$

$\cos + \quad \sin + \quad , \quad$ Quad I

$x = 5 \quad y = \sqrt{39} \quad r = 8$

$r = \sqrt{x^2+y^2}$

$8 = \sqrt{(5)^2+y^2}$
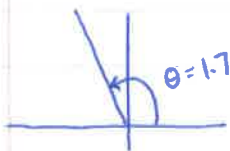
$\sec\theta = \frac{r}{x} = \boxed{\frac{8}{5}}$

$64 = 25 + y^2$

$39 = y^2$

$y = \sqrt{39}$

③ Reference angle of $\theta = 1.7$

$\frac{1.7}{1} \cdot \frac{180}{\pi} = 97.4°$

Ref angle $= \pi - 1.7 = \boxed{1.4416}$

$\theta = 1.7$

④ If $\cot\theta = \frac{-3}{1}$ in Quad II, find $\sin\theta$

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

$r = \sqrt{x^2+y^2}$

$x = -3 \quad y = 1 \quad r = \sqrt{10}$

$r = \sqrt{(-3)^2+(1)^2}$

$r = \sqrt{10}$

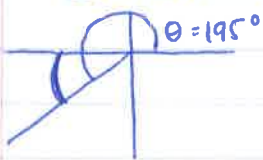$\sin\theta = \frac{y}{r} = \frac{1}{\sqrt{10}} = \boxed{\frac{\sqrt{10}}{10}}$

⑤ $\tan\frac{\pi}{4} \Rightarrow \frac{\pi}{4}\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right) \Rightarrow \tan = \frac{\sin}{\cos} = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = \frac{\sqrt{2}}{2} \cdot \frac{2}{\sqrt{2}} = \frac{2\sqrt{2}}{2\sqrt{2}} = \boxed{1}$

⑥ $\sec \frac{\pi}{6}$ ⇒ $\frac{\pi}{6}\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

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

⑦ Reference angle of $\theta = -165°$
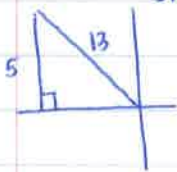
$-165° + 360 = 195°$

$\theta = 195°$

Reference angle = $195 - 180$

$\boxed{= 15°}$

⑧ If $\sin\theta = \frac{5}{13}$ and $\cot\theta < 0$, find $\sec\theta$

$\sin +$ $\tan -$; Quad II

$x = -12$ $y = 5$ $r = 13$
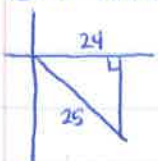
$r = \sqrt{x^2 + y^2}$

$13 = \sqrt{x^2 + (5)^2}$

$169 = x^2 + 25$

$144 = x^2$

$\boxed{x = -12}$ ← neg b/c in Quad II

$\sec\theta = \frac{r}{x} = \boxed{-\frac{13}{12}}$

⑨ If $\cos\theta = \frac{24}{25}$ and $-\frac{\pi}{2} < \theta < 0$, find $\tan\theta$

↑ the angle is in 4th Quadrant

$x = 24$ $y = -7$ $r = 25$

$r = \sqrt{x^2 + y^2}$
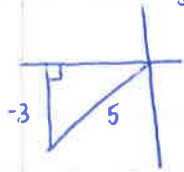
$25 = \sqrt{(24)^2 + y^2}$

$625 = 576 + y^2$

$49 = y^2$

$\boxed{y = -7}$ ← neg b/c in Quad IV

$\tan\theta = \frac{y}{x} = \boxed{\frac{-7}{24}}$

(10) If $\sin \theta = -\frac{3}{5}$ and $\cos\theta < 0$, find $\cos \theta$

sin –   cos – ;   Quad III

$x = -4$ $y = -3$ $r = 5$

$r = \sqrt{x^2 + y^2}$

$5 = \sqrt{x^2 + (3)^2}$

$25 = x^2 + 9$

$16 = x^2$

$\boxed{-4 = X}$ ← neg b/c in Quad III

$\cos\theta = \frac{x}{r} = \boxed{\dfrac{-4}{5}}$