§5.2

(2 or 4) $x = \cos t$, $y = \sin t$ $\therefore P(x,y) = P(\cos t, \sin t)$

$t = 0 = 2\pi$ $\cos 0 = \cos 2\pi = 1$ & $\sin 0 = \sin 2\pi = 0$
$P(x,y) \Rightarrow (1,0)$

$t = \pi/6$ $\boxed{\cos \pi/6 = \sqrt{3}/2 \text{ \& } \sin \pi/6 = 1/2}$ $(\sqrt{3}/2, 1/2)$

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$t = \pi/2$ $\boxed{\cos \pi/2 = 0 \text{ \& } \sin \pi/2 = 1}$ $(0,1)$

$t = 2\pi/3$ is $\bar{t} = \pi/3$ in QII $\boxed{\cos 2\pi/3 = -1/2 \text{ \& } \sin 2\pi/3 = \sqrt{3}/2}$ $(-1/2, \sqrt{3}/2)$

$t = 5\pi/6$ is $\bar{t} = \pi/6$ in QII $\boxed{\cos \frac{5\pi}{6} = -\frac{\sqrt{3}}{2} \text{ \& } \sin \frac{5\pi}{6} = \frac{1}{2}}$ $(-\sqrt{3}/2, 1/2)$

$t = \pi$ $\boxed{\cos \pi = -1 \text{ \& } \sin \pi = 0}$ $(-1,0)$

$t = 7\pi/6$ $\bar{t} = \pi/6$ in QIII $\boxed{\cos 7\pi/6 = -\frac{\sqrt{3}}{2} \text{ \& } \sin 7\pi/6 = -\frac{1}{2}}$ $(-\sqrt{3}/2, -1/2)$

$t = 4\pi/3$ $\bar{t} = \pi/3$ in QIII $\boxed{\cos 4\pi/3 = -\frac{1}{2} \text{ \& } \sin 4\pi/3 = -\frac{\sqrt{3}}{2}}$ $(-1/2, -\sqrt{3}/2)$

$t = 3\pi/2$ $\boxed{\cos 3\pi/2 = 0 \text{ \& } \sin 3\pi/2 = -1}$ $(0,-1)$

$t = 5\pi/3$ $\bar{t} = \pi/3$ in QIV $\boxed{\cos 5\pi/3 = 1/2 \text{ \& } \sin 5\pi/3 = -\sqrt{3}/2}$ $(1/2, -\sqrt{3}/2)$

$t = 11\pi/6$ $\bar{t} = \pi/6$ in QIV $\boxed{\cos 11\pi/6 = \frac{\sqrt{3}}{2} \text{ \& } \sin \frac{11\pi}{6} = -1/2}$ $(\sqrt{3}/2, -1/2)$

(5 or 7) ⓐ $\sin 7\pi/6 = \boxed{-1/2}$ since $7\pi/6$ $\bar{t} = \frac{7\pi}{6} - \frac{6\pi}{6}$ in QIII where $= \pi/6$ cos & sin are neg.

ⓑ $\sin -\pi/6 = \boxed{-1/2}$ $\bar{t} = \pi/6$ in QIV

ⓒ $\sin 11\pi/6 = \boxed{-1/2}$ $\bar{t} = 11\pi/6$ in QIV

(7 or 9) ⓐ $\cos 3\pi/4 = \boxed{-\sqrt{2}/2}$ since $\bar{t} = \frac{4\pi}{4} - \frac{3\pi}{4} = \frac{\pi}{4}$ in QII

ⓑ $\cos 5\pi/4 = \boxed{-\sqrt{2}/2}$ $\bar{t} = \pi/4$ in QIII

ⓒ $\cos 7\pi/4 = \boxed{\sqrt{2}/2}$ $\bar{t} = \pi/4$ in QIV

(9 or 11) ⓐ $\sin 7\pi/3 = \boxed{\sqrt{3}/2}$ $\bar{t} = \frac{7\pi}{3} - \frac{6\pi}{3} = \pi/3$ in QI

ⓑ $\csc 7\pi/3 = \boxed{2\sqrt{3}/3}$ since $\csc = 1/\sin$

ⓒ $\cot 7\pi/3 = \frac{\cos}{\sin} = \frac{1/2}{\sqrt{3}/2} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{\sqrt{3}}{3}}$

(13 or 15) ⓐ $\sec 11\pi/3 = \boxed{2}$ $\bar{t} = 12\pi/3 - 11\pi/3 = \pi/3$ in QIV; $\sec = \frac{1}{\cos} = \frac{1}{1/2}$

ⓑ $\csc 11\pi/3 = \boxed{\frac{-2\sqrt{3}}{3}}$ $\csc = 1/\sin = 2/\sqrt{3}$ in QIV is neg

ⓒ $\sec -\pi/3 = \boxed{2}$ $\bar{t} = \pi/3$ in QIV same as ⓐ

(29 or 31) $(\sqrt{5}/4, -\sqrt{11}/4)$ is on the unit circle since $\left(\frac{\sqrt{5}}{4}\right)^2 + \left(-\frac{\sqrt{11}}{4}\right)^2 = 1 \Rightarrow \frac{5}{16} + \frac{11}{16} = \frac{16}{16}$ ✓

$(\cos t, \sin t)$ are coordinates on unit circle so:

$\boxed{\sin t = -\sqrt{11}/4}$ $\boxed{\cos t = \sqrt{5}/4}$ $\tan t = \frac{\sin}{\cos} = \frac{-\sqrt{11}/4}{\sqrt{5}/4} = \frac{-\sqrt{11}}{\sqrt{5}} = \frac{-\sqrt{55}}{5}$

$\boxed{\tan t = \frac{-\sqrt{55}}{5}}$

(30 or 32) $(-1/3, -2\sqrt{2}/3)$ is on the unit circle since $\left(-\frac{1}{3}\right)^2 + \left(\frac{-2\sqrt{2}}{3}\right)^2 = \frac{1}{9} + \frac{8}{9} = \frac{9}{9} = 1$

$(\cos t, \sin t)$ are coordinates on unit circle so

$\boxed{\sin t = -2\sqrt{2}/3}$ $\boxed{\cos t = -1/3}$ $\tan t = \frac{-2\sqrt{2}/3}{-1/3} = 2\sqrt{2}$

$\boxed{\tan t = 2\sqrt{2}}$

(42 or 44) $\tan(-1.3)$

ⓐ Using figure app y & x-values & $\tan = \frac{y}{x}$
$y \approx -0.95$ & $x \approx 0.27$ $\therefore \tan -1.3 \approx \frac{-0.95}{0.27}$
so $\boxed{\tan -1.3 \approx -3.52}$

ⓑ Using a calculator $\boxed{\tan -1.3 \approx -3.60210}$

(46 or 48) Sign based on terminal point

ⓐ $\tan t \sec t$ in QIV

$\boxed{\tan t \text{ is } \text{“}-\text{”}}$ & $\sec t$ is "+" in QIV

$- \cdot + = -$

(56 or 58) Write $\tan t$ in terms of $\cos t$ in QIII

$\frac{\sin t}{\cos t} = \frac{-}{+} \Rightarrow \sin^2 + \cos^2 = 1 \Rightarrow \sin^2 = 1 - \cos^2$
$\Rightarrow \sin = -\sqrt{1-\cos^2}$

$$\boxed{\tan t = \frac{-\sqrt{1-\cos^2 t}}{\cos t}}$$

(57 or 59) $\sec t$ in $\tan t$ in QII
$\tan^2 t + 1 = \sec^2 t \Rightarrow \boxed{\sec t = \sqrt{\tan^2 t + 1}}$

§5.2 con'd

(58 or 60) csc t in cot t in Q III ← csc "−"

S	A
T	C

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

$\Rightarrow \csc t = \pm\sqrt{1 + \cot^2 t}$

so $\boxed{\csc t = -\sqrt{1 + \cot^2 t}}$

(66 or 68) $\tan t = 1/4$ in Q III

S	A
(T)	C

$x = 4$ & $y = 1$ $\quad r = \sqrt{17}$

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

$16 + 1 = r^2 \Rightarrow r = \pm\sqrt{17}$ (plus)

$$\boxed{\begin{array}{ll} \sin t = -\frac{1}{\sqrt{17}} = -\frac{\sqrt{17}}{17} & \csc t = -\sqrt{17} \\ \cos t = -\frac{4}{\sqrt{17}} = -\frac{4\sqrt{17}}{17} & \sec t = -\frac{\sqrt{17}}{4} \\ \tan t = \frac{1}{4} & \cot t = 4 \end{array}}$$

& terminal point is $\left(-\frac{4\sqrt{17}}{17}, -\frac{\sqrt{17}}{17}\right)$