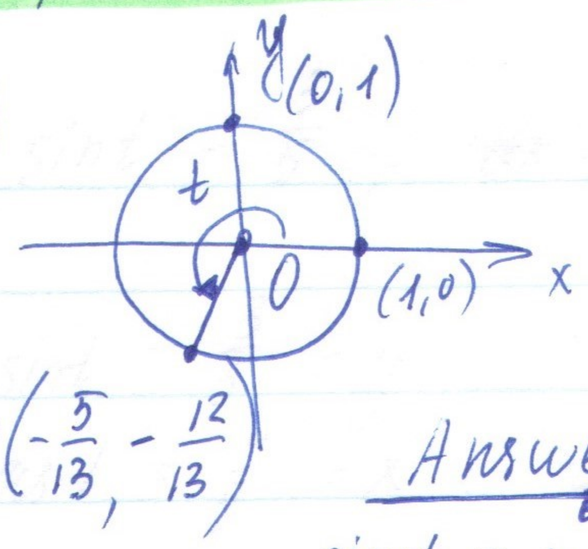
MTH30

Section 4.2/ 2, 20, 22, 24, 26, 28, 30, 36.

Homework

#2




find the values of all trigonometric functions at $t$.

Answer (with solution):

$\sin t = y = \left(-\frac{12}{13}\right)$, $\cos t = x = \left(-\frac{5}{13}\right)$.

$\tan t = \frac{y}{x} = \frac{-\frac{12}{13}}{-\frac{5}{13}} = \frac{12}{13} \cdot \frac{13}{5} = \left(\frac{12}{5}\right)$, $\cot t = \left(\frac{5}{12}\right)$.

$\csc t = \frac{1}{y} = \frac{1}{-\frac{12}{13}} = \left(-\frac{13}{12}\right)$, $\sec t = \frac{1}{x} = \frac{1}{-\frac{5}{13}} = \left(-\frac{13}{5}\right)$.

#20

use the unit circle and odd/even functions.

a) $\cos \frac{\pi}{3} = x = \boxed{\frac{1}{2}}$

b) $\cos\left(-\frac{\pi}{3}\right) = \cos \frac{\pi}{3} = \boxed{\frac{1}{2}}$

#22

a) $\sin\left(\frac{2\pi}{3}\right) \overset{\text{even}}{=\!=} y = \boxed{\frac{\sqrt{3}}{2}}$

$2 \cdot \frac{180^\circ}{3} = 120^\circ \Rightarrow$ point $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

b) $\sin\left(-\frac{2\pi}{3}\right) = -\sin\left(\frac{2\pi}{3}\right) = \boxed{-\frac{\sqrt{3}}{2}}$

odd

#24

$\tan \frac{11\pi}{6} = \tan(330^\circ) = \frac{y}{x} = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \boxed{-\frac{1}{\sqrt{3}}} = \boxed{-\frac{\sqrt{3}}{3}}$

point $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

$\tan\left(-\frac{11\pi}{6}\right) = -\tan\left(\frac{11\pi}{6}\right) = \boxed{\frac{1}{\sqrt{3}}} = \boxed{+\frac{\sqrt{3}}{3}}$

odd

#26 $\sin t = \frac{3}{5}$, $\cos t = \frac{4}{5}$ find $\tan t$, $\csc t$, $\cot t$, $\sec t$.

$\sin t = \frac{3}{5} = y$, therefore $y = \frac{3}{5}$

$\cos t = \frac{4}{5} = x$, therefore $x = \frac{4}{5}$

Thus $\tan t = \frac{y}{x} = \frac{\frac{3}{5}}{\frac{4}{5}} = \boxed{\frac{3}{4}}$, $\cot t = \frac{x}{y} = \boxed{\frac{4}{3}}$

$\sec t = \frac{1}{x} = \frac{1}{\frac{4}{5}} = \boxed{\frac{5}{4}}$, $\csc t = \frac{1}{y} = \frac{1}{\frac{3}{5}} = \boxed{\frac{5}{3}}$

#28 $\sin t = \frac{2}{3}$, $\cos t = \frac{\sqrt{5}}{3}$

similarly to the previous problem, $x = \frac{\sqrt{5}}{3}$, $y = \frac{2}{3}$

$\tan t = \frac{y}{x} = \frac{\frac{2}{3}}{\frac{\sqrt{5}}{3}} = \frac{2}{\sqrt{5}} = \boxed{\frac{2\sqrt{5}}{5}}$, $\cot t = \boxed{\frac{\sqrt{5}}{2}}$

$\csc t = \frac{1}{y} = \frac{1}{\frac{2}{3}} = \boxed{\frac{3}{2}}$,

$\sec t = \frac{1}{x} = \frac{1}{\frac{\sqrt{5}}{3}} = \frac{3}{\sqrt{5}} = \boxed{\frac{3\sqrt{5}}{5}}$.

#30 $\sin t = \frac{7}{8}$; $0 \le t < \frac{\pi}{2}$. use Pythagorean theorem to find $\cos t$. $(\sin^2 t + \cos^2 t = 1)$

$\left(\frac{7}{8}\right)^2 + \cos^2 t = 1$ $\quad \cos^2 t = 1 - \frac{49}{64} = \frac{15}{64}$

$\boxed{\cos t = \frac{\sqrt{15}}{8}}$, because cosine is positive in $\overline{I}$ quadrant.

#36.

$\sin^2 \frac{\pi}{3} + \cos^2 \frac{\pi}{3} = \boxed{1}$

- used identity $\sin^2 x + \cos^2 x = 1$.