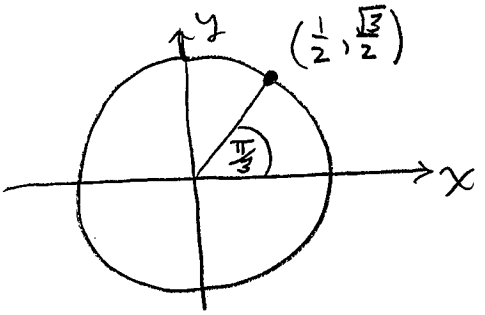
Name:
Stu#:

SOLUTIONS

(1) [3 points] Compute $2\sin\left(\frac{\pi}{3}\right) - 3\tan\left(\frac{\pi}{3}\right)$.



$$\therefore\ 2\sin\left(\tfrac{\pi}{3}\right) - 3\tan\left(\tfrac{\pi}{3}\right)$$

$$= 2\sin\left(\tfrac{\pi}{3}\right) - 3\,\frac{\sin\left(\frac{\pi}{3}\right)}{\cos\left(\frac{\pi}{3}\right)}$$

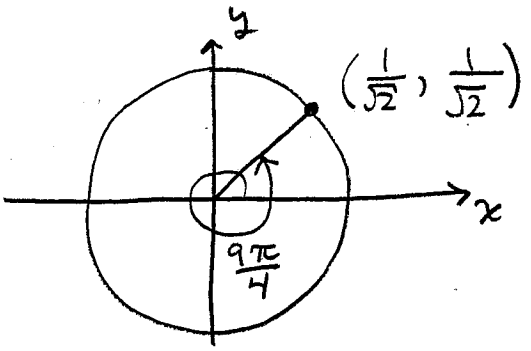
$$= 2\left(\tfrac{\sqrt{3}}{2}\right) - 3\,\frac{\left(\frac{\sqrt{3}}{2}\right)}{\left(\frac{1}{2}\right)}$$

$$= \sqrt{3} - 3\sqrt{3}$$

$$= \boxed{-2\sqrt{3}.}$$

(2) [4 points] Compute $\sin(405°)$, $\cos(405°)$ and $\tan(405°)$.

$$405° \cdot \left(\frac{\pi \text{ radians}}{180°}\right) = \frac{9\pi}{4} \text{ radians.}$$



$$\therefore \sin(405°) = \sin\left(\tfrac{9\pi}{4}\right) = \boxed{\frac{1}{\sqrt{2}}}$$

$$\cos(405°) = \cos\left(\tfrac{9\pi}{4}\right) = \boxed{\frac{1}{\sqrt{2}}}$$

$$\tan(405°) = \tan\left(\tfrac{9\pi}{4}\right) = \frac{\sin\left(\frac{9\pi}{4}\right)}{\cos\left(\frac{9\pi}{4}\right)} = \frac{\left(\frac{1}{\sqrt{2}}\right)}{\left(\frac{1}{\sqrt{2}}\right)} = \boxed{1}$$

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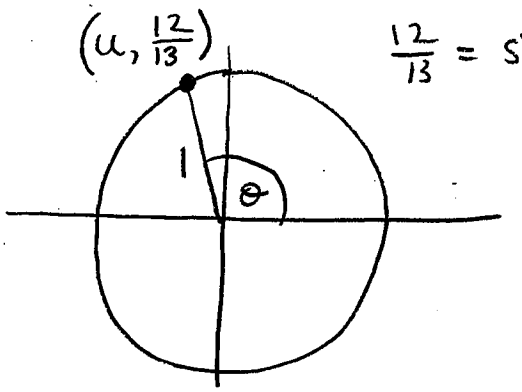
(3) [4 points] Compute $\sec(\theta)$ if $\sin(\theta) = \frac{12}{13}$ and θ is in Quadrant II.

$u = \cos(\theta)$

$\frac{12}{13} = \sin(\theta)$



$\therefore u^2 + \left(\frac{12}{13}\right)^2 = 1$

$u^2 = 1 - \left(\frac{12}{13}\right)^2$

$u = -\sqrt{1 - \frac{144}{169}}$

$= -\sqrt{\frac{25}{169}}$

$= -\frac{5}{13}$

↑ negative since θ in Quad. II

$\therefore \cos(\theta) = \frac{-5}{13}$

$\therefore \sec(\theta) = \frac{1}{\cos(\theta)}$

$= \boxed{-\frac{13}{5}}$

(4) [4 points] Determine the exact value of $\sin\left(-\frac{\pi}{12}\right)\csc\left(\frac{25\pi}{12}\right)$.

$\sin\left(-\frac{\pi}{12}\right)\csc\left(\frac{25\pi}{12}\right)$

$= -\sin\left(\frac{\pi}{12}\right)\csc\left(\frac{25\pi}{12}\right)$ since sine is odd

$= -\sin\left(\frac{\pi}{12}\right)\left[\frac{1}{\sin\left(\frac{24\pi}{12} + \frac{\pi}{12}\right)}\right]$

$= -\sin\left(\frac{\pi}{12}\right)\left[\frac{1}{\sin\left(2\pi + \frac{\pi}{12}\right)}\right]$

$= -\sin\left(\frac{\pi}{12}\right)\left[\frac{1}{\sin\left(\frac{\pi}{12}\right)}\right]$ by periodicity

$= \boxed{-1}$