Trigonometry review

$\boxed{\#10}$

(a) $\sin 3x = -\frac{\sqrt{2}}{2}$ $\quad [0, 2\pi)$

using the table ... $\sin t = -\frac{\sqrt{2}}{2}$ for $t = \frac{5\pi}{4}, \frac{7\pi}{4}$

$$\frac{3x}{3} = \frac{\frac{5\pi}{4} + 2\pi n}{3} \quad \text{or} \quad \frac{3x}{3} = \frac{\frac{7\pi}{4} + 2\pi k}{3}$$

$$x = \frac{5\pi}{12} + \frac{2\pi}{3}n \quad \text{or} \quad x = \frac{7\pi}{12} + \frac{2\pi}{3}k$$

$\frac{5\pi}{12} < 2\pi$ take it , $\frac{7\pi}{12} < 2\pi$ take it

$\frac{5\pi}{12} + \frac{2\pi \cdot 4}{3 \cdot 4} = \frac{13\pi}{12} < 2\pi$ OK $(n=1)$, $\frac{7\pi}{12} + \frac{2\pi \cdot 4}{3 \cdot 4} = \frac{15\pi}{12} < 2\pi$ OK $(k=1)$

$\frac{5\pi}{12} + \frac{4\pi \cdot 4}{3 \cdot 4} = \frac{21\pi}{12} < 2\pi$ OK $(n=2)$, $\frac{7\pi}{12} + \frac{2\pi \cdot 2 \cdot 4}{3 \cdot 4} = \frac{23\pi}{12} < 2\pi$ OK $(k=2)$

$\frac{5\pi}{12} + \frac{2\pi}{3} \cdot 3 = \frac{29\pi}{12} < 2\pi$ OK $(n=3)$, $\frac{7\pi}{12} + \frac{2\pi}{3} \cdot 3 = \frac{31\pi}{12} < 2\pi$ OK $(k=3)$

STOP, because otherwise, for $n=4$ and $k=4$ we will be adding 2π to $\frac{5\pi}{12}$ and $\frac{7\pi}{12}$.

Answer: $\frac{5\pi}{12}, \frac{7\pi}{12}, \frac{21\pi}{12}, \frac{23\pi}{12}, \frac{29\pi}{12}, \frac{31\pi}{12}$.

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(b) $7\cos\theta + 9 = -2\cos\theta$ $\quad [0, 2\pi)$

$$\frac{9\cos\theta}{9} = \frac{-9}{9} \qquad \cos\theta = -1$$

From the table, $\cos\theta = -1$ when $\theta = \pi$

$$\boxed{\text{Answer: } \theta = \pi}$$

(c) $3\tan^2 x - 9 = 0$ $\qquad \dfrac{3\tan^2 x}{3} = \dfrac{9}{3}$ $\qquad \tan^2 x = 3$

$\tan x = \pm\sqrt{3}$

From the table, $\tan x = \sqrt{3}$ for $x = \dfrac{\pi}{3}, \dfrac{4\pi}{3}$

$\tan x = -\sqrt{3}$ for $x = \dfrac{2\pi}{3}, \dfrac{5\pi}{3}$

- all of the values are good, the tangent function is defined on them.

$$\boxed{\text{Answer: } \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}}$$