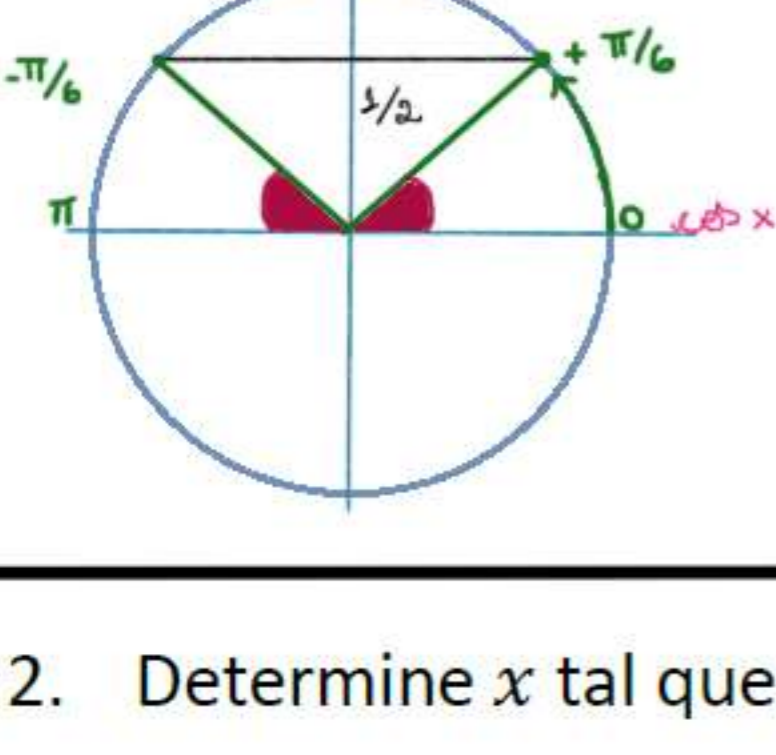


1. Determine  $x \in [0, 2\pi]$  tal que  $2 \cdot \text{sen } x = 1$ .



$\text{sen } x = 1/2$   
 $x = (0 + \pi/6)$  ou  $x = (\pi - \pi/6)$   
 $x = \pi/6$  ou  $x = 5\pi/6$

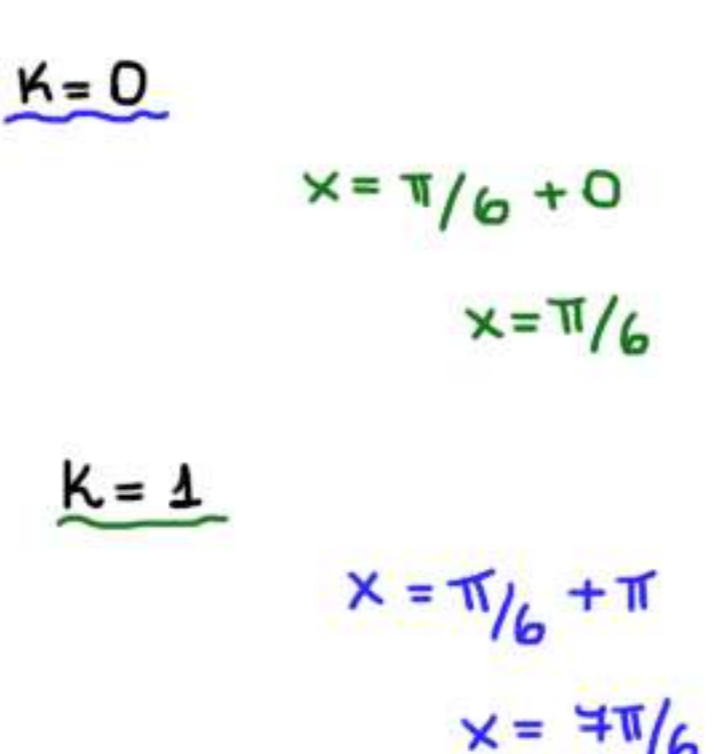
$S = x: \{ \pi/6, 5\pi/6 \}$  (casamente com  $k=0$ )

2. Determine  $x$  tal que  $0 < x < \pi$  e  $\text{sen } 3x = \frac{1}{2}$ .

$\text{sen } \theta = 1/2 \rightarrow \theta = \pi/6 + 2k\pi$  ou  $\theta = 5\pi/6 + 2k\pi$   
 $3x = \theta \rightarrow x = \theta/3$   
 $x = \pi/18 + \frac{2k\pi}{3}$  ou  $x = 5\pi/18 + \frac{2k\pi}{3}$   
 •  $k=0$   
 $x = \pi/18$  ou  $x = 5\pi/18$   
 •  $k=1$   
 $x = \pi/18 + 2\pi/3 = 13\pi/18$  ou  $x = 5\pi/18 + 2\pi/3 = 17\pi/18$

$S = \{ \pi/18, 5\pi/18, 13\pi/18, 17\pi/18 \}$

3. Determine  $x$  tal que  $0 < x < 2\pi$  e  $\text{cos } 2x = \frac{1}{2}$ .

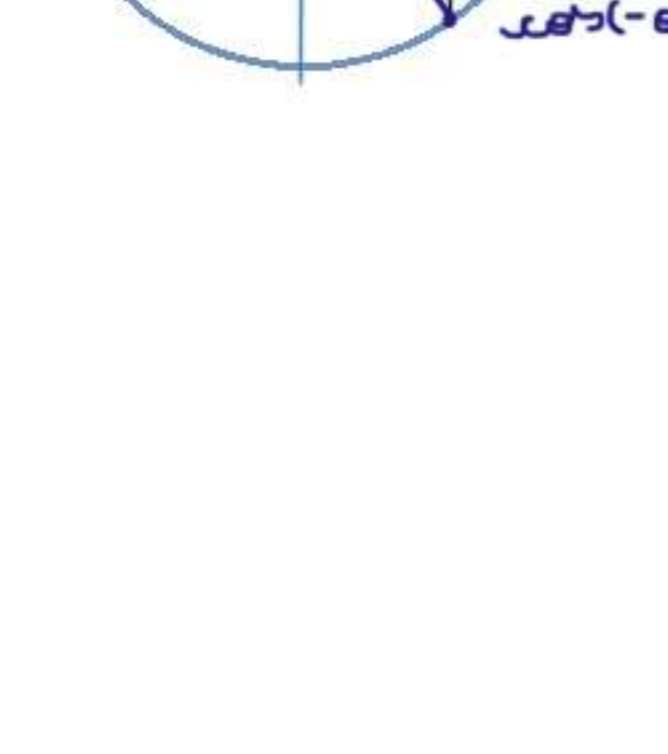


$\text{cos } \theta = 1/2$   
 $\theta = \pi/3$  ou  $\theta = 5\pi/3$   
 $\theta = \pi/3 + 2k\pi$  ou  $\theta = (2\pi - \pi/3) + 2k\pi$   
 $2x = \theta \rightarrow x = \theta/2$   
 $x = \pi/6 + k\pi$  ou  $x = 5\pi/6 + k\pi$

$k=0$   
 $x = \pi/6 + 0$  ou  $x = 5\pi/6 + 0$   
 $x = \pi/6$  ou  $x = 5\pi/6$   
 $k=1$   
 $x = \pi/6 + \pi$  ou  $x = 5\pi/6 + \pi$   
 $x = 7\pi/6$  ou  $x = 11\pi/6$   
 $k=2$   
 $x = \pi/6 + 2\pi$  ou  $x = 5\pi/6 + 2\pi$   
 $x = 13\pi/6 > 2\pi$  ou  $x = 17\pi/6 > 2\pi$

$S = \{ \pi/6, 5\pi/6, 7\pi/6, 11\pi/6 \}$

4. Obtenha  $x$  tal que  $\text{cos } 3x = \text{cos } 2x$  e  $0 \leq x \leq \pi$ .



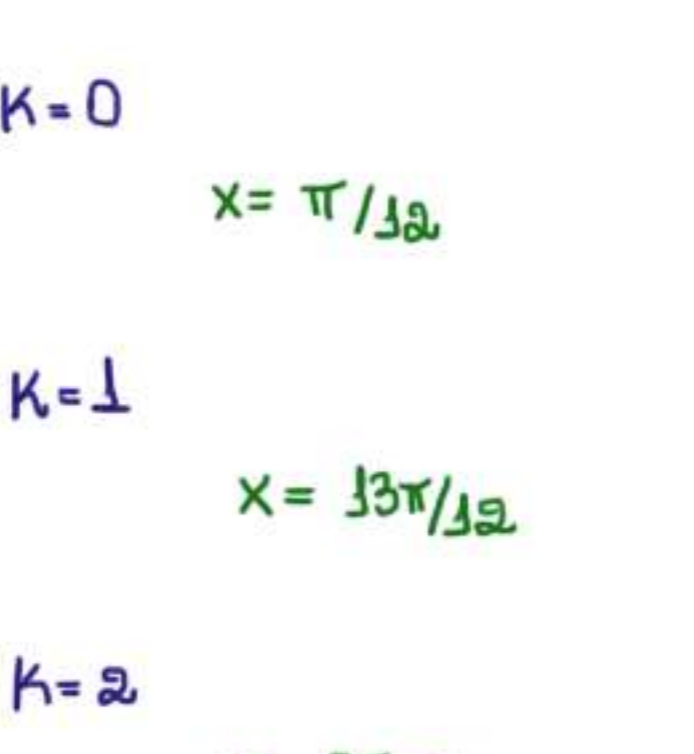
$\text{cos } \theta = \text{cos } (-\theta)$   
 $2x = -3x$   
 $5x = 0 + 2k\pi$   
 $x = \frac{2k\pi}{5}$

•  $k=0 \rightarrow x = 0$   
 •  $k=1 \rightarrow x = 2\pi/5$   
 •  $k=2 \rightarrow x = 4\pi/5$

$S = \{ 0, 2\pi/5, 4\pi/5 \}$

Resolva, em  $0 \leq x \leq 2\pi$ , as seguintes equações:

5.  $\text{cos } 2x = \frac{\sqrt{3}}{2}$



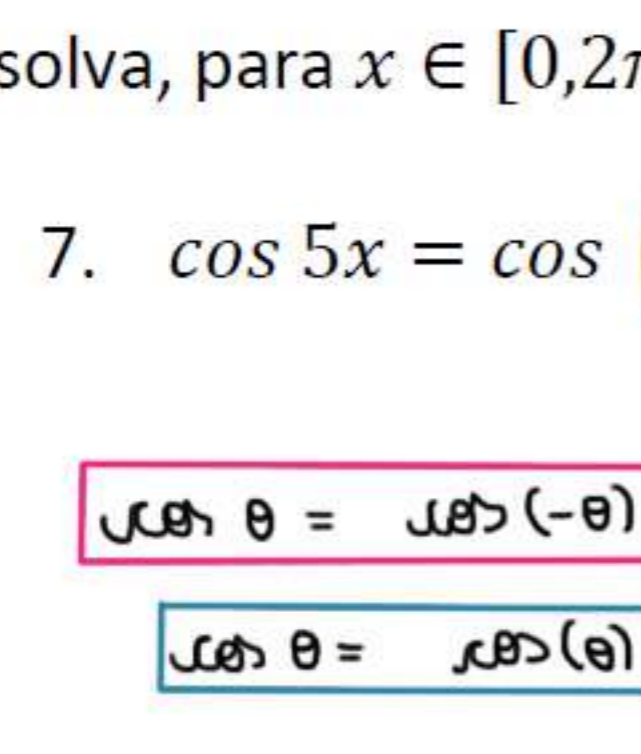
$\text{cos } \theta = \sqrt{3}/2$   
 $\theta = 0 + \pi/6$  ou  $\theta = 2\pi - \pi/6$   
 $\theta = \pi/6 + 2k\pi$  ou  $\theta = 11\pi/6 + 2k\pi$   
 $2x = \theta \rightarrow x = \theta/2$

$x = \frac{\pi/6 + 2k\pi}{2}$  ou  $x = \frac{11\pi/6 + 2k\pi}{2}$   
 $x = \pi/12 + k\pi$  ou  $x = 11\pi/12 + k\pi$

$k=0$   
 $x = \pi/12$  ou  $x = 11\pi/12$   
 $k=1$   
 $x = 13\pi/12$  ou  $x = 23\pi/12$   
 $k=2$   
 $x = 25\pi/12$  ou  $x = 35\pi/12 > 2\pi$

$S = \{ \pi/12, 11\pi/12, 13\pi/12, 23\pi/12 \}$

6.  $\text{cos} \left( x + \frac{\pi}{6} \right) = 0$



$\text{cos } \theta = 0$   
 $\theta = \pi/2 + 2k\pi$  ou  $\theta = 3\pi/2 + 2k\pi$   
 $\theta = x + \pi/6 \rightarrow x = \theta - \pi/6$

$x = \pi/2 + 2k\pi - \pi/6$  ou  $x = 3\pi/2 + 2k\pi - \pi/6$   
 $x = \pi/3 + 2k\pi$  ou  $x = 4\pi/3 + 2k\pi$

$k=0$   
 $x = \pi/3 + 2 \cdot 0 \cdot \pi$  ou  $x = 4\pi/3 + 2 \cdot 0 \cdot \pi$   
 $x = \pi/3$  ou  $x = 4\pi/3$   
 $k=1$   
 $x = (\pi/3 + 2\pi) > 2\pi$  ou  $x = (4\pi/3 + 2\pi) > 2\pi$

$S = x = \{ \pi/3, 4\pi/3 \}$

Resolva, para  $x \in [0, 2\pi]$ , as seguintes equações:

7.  $\text{cos } 5x = \text{cos} \left( x + \frac{\pi}{3} \right)$

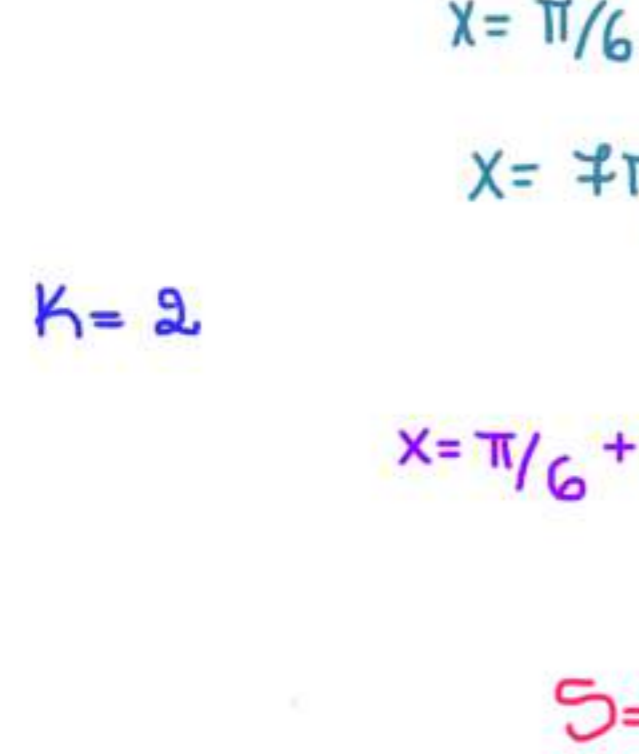
$\text{cos } \theta = \text{cos} (-\theta)$   
 $\text{cos } \theta = \text{cos} (\theta)$   
 $5x = -(x + \pi/3)$   
 $4x = \pi/3 + 2k\pi$  ou  $6x = -\pi/3 + 2k\pi$   
 $x = \pi/12 + k\pi/2$  ou  $x = k\pi/3 - \pi/18$

•  $k=0$   
 $x = \pi/12$  ou  $x = -\pi/18 < 0$  ✗  
 •  $k=1$   
 $x = \pi/12 + \pi/2$  ou  $x = \pi/3 - \pi/18$   
 $x = 7\pi/12$  ou  $x = 5\pi/18$   
 •  $k=2$   
 $x = \pi/12 + 2\pi/2$  ou  $x = 2\pi/3 - \pi/18$   
 $x = 13\pi/12$  ou  $x = 11\pi/18$   
 •  $k=3$   
 $x = \pi/12 + 3\pi/2$  ou  $x = 3\pi/3 - \pi/18$   
 $x = 19\pi/12$  ou  $x = 17\pi/18$   
 •  $k=4$   
 $x = \pi/12 + 4\pi/2$  ou  $x = 4\pi/3 - \pi/18$   
 $x = 25\pi/12 > 2\pi$  ou  $x = 23\pi/18$

•  $k=5$   
 $x = 5\pi/3 - \pi/18$  ou  $x = \frac{29\pi}{4}$   
 •  $k=6$   
 $x = 6\pi/3 - \pi/18$  ou  $x = 35\pi/18$

$S = \left\{ \frac{\pi}{12}, \frac{5\pi}{18}, \frac{7\pi}{12}, \frac{11\pi}{18}, \frac{13\pi}{12}, \frac{17\pi}{18}, \frac{19\pi}{12}, \frac{23\pi}{18}, \frac{25\pi}{12}, \frac{29\pi}{18}, \frac{35\pi}{18} \right\}$

8.  $\text{tg } 2x = \sqrt{3}$



$\text{tg } 2x = \sqrt{3}$  ou  $\text{tg } \theta = \sqrt{3}$   
 $\theta = \pi/3 + 2k\pi$  ou  $\theta = 4\pi/3 + 2k\pi$   
 $2x = \theta \rightarrow x = \theta/2$

$x = \pi/6 + k\pi$  ou  $x = 2\pi/3 + k\pi$

$k=0$   
 $x = \frac{\pi}{6} + 0$  ou  $x = 2\pi/3 + 0$   
 $x = \pi/6$  ou  $x = 2\pi/3$   
 $k=1$   
 $x = \pi/6 + \pi$  ou  $x = 2\pi/3 + \pi$   
 $x = 7\pi/6$  ou  $x = 5\pi/3$   
 $k=2$   
 $x = \pi/6 + 2\pi > 2\pi$  ou  $x = 2\pi/3 + 2 > 2\pi$

$S = \{ \pi/6, 2\pi/3, 5\pi/3, 7\pi/6 \}$

9.  $\text{tg } 2x = \text{tg} \left( x + \frac{\pi}{4} \right)$

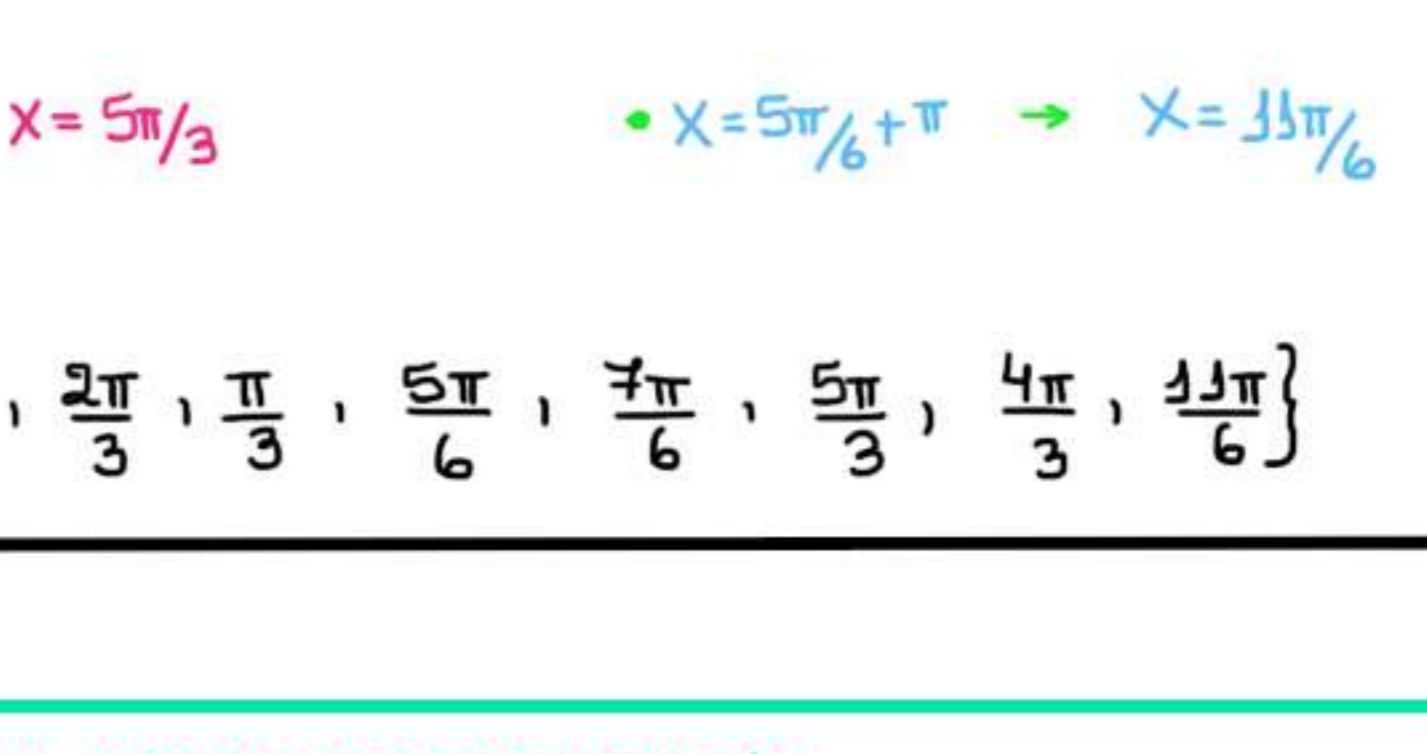
$\text{tg}(2x) = \text{tg} \left( x + \frac{\pi}{4} \right)$   
 $\text{tg } \theta = \text{tg} (\theta + 180)$   
 $2x = x + \frac{\pi}{4} + \pi$   
 $x = 5\pi/4 + 2k\pi$   
 $\text{tg } \theta = \text{tg } \theta$   
 $2x = x + \frac{\pi}{4}$   
 $x = \frac{\pi}{4} + 2k\pi$

$k=0$   
 $x = \frac{5\pi}{4}$  ou  $x = \frac{\pi}{4}$   
 $\text{tg} \left( 2 \cdot \frac{5\pi}{4} \right) = \text{tg} \frac{5\pi}{2} \rightarrow \text{div}$  ou  $\text{tg} \left( 2 \cdot \frac{\pi}{4} \right) = \text{tg} \left( \frac{\pi}{2} \right) \rightarrow \text{div}$

$k=0$   
 $x > 2\pi$   
 $S = \{ \emptyset \}$

10.  $\text{tg}^2 2x = 3$

$\text{tg } 2x = \pm \sqrt{3}$



•  $x = \pi/6 + k\pi$  ou  $x = \pi/3 + k\pi$   
 •  $x = \frac{2\pi}{3} + k\pi$  ou  $x = 5\pi/6 + k\pi$

$k=0$   
 $x = \pi/6$  ou  $x = \pi/3$   
 $x = 2\pi/3$  ou  $x = 5\pi/6$

$k=1$   
 $x = \pi/6 + \pi \rightarrow x = 7\pi/6$  ou  $x = \pi/3 + \pi \rightarrow x = 4\pi/3$   
 $x = 2\pi/3 + \pi \rightarrow x = 5\pi/3$  ou  $x = 5\pi/6 + \pi \rightarrow x = 11\pi/6$

$S = \left\{ \frac{\pi}{6}, \frac{2\pi}{3}, \frac{\pi}{3}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{5\pi}{3}, \frac{4\pi}{3}, \frac{11\pi}{6} \right\}$