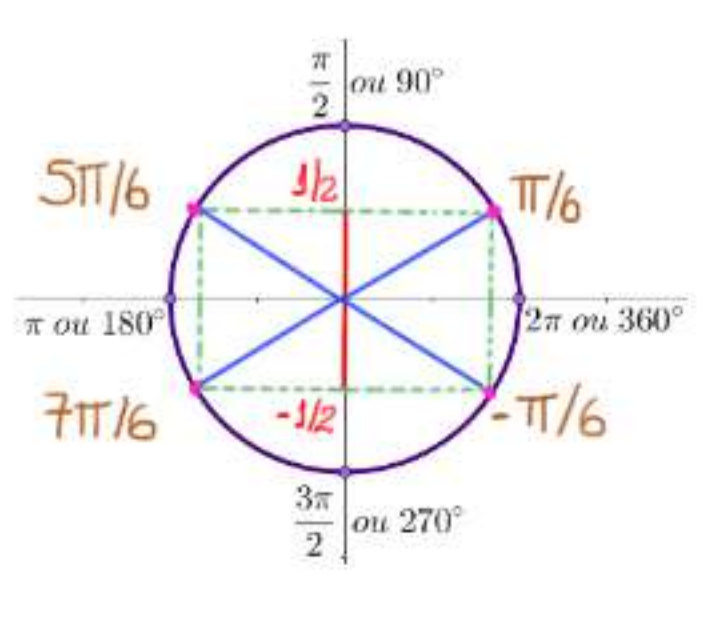
Resolva as equações abaixo, no domínio $\mathbb{R}$:

1. $sen^2\,x = \frac{1}{4}$

$sen^2 x = \frac{1}{4}$

$sen\,x = \pm\sqrt{\frac{1}{4}} = \pm\frac{1}{2}$

$sen\,x = \frac{1}{2}$



$sen^{-1}(1/2) = 30° \Rightarrow x = \pi/6 + 2k\pi$

$x = \pi - \pi/6 = (6\pi - \pi)/6 = 5\pi/6 + 2k\pi$

$sen\,x = -\frac{1}{2}$

$x = \pi + \pi/6 = (6\pi + \pi)/6 = 7\pi/6 + 2k\pi$

$x = 0 - \pi/6 = -\pi/6 + 2k\pi$

$S = \left\{x \in \mathbb{R} / \ x = \frac{\pi}{6} + 2k\pi \ \text{ou} \ x = \frac{5\pi}{6} + 2k\pi \ \text{ou} \ x = \frac{7\pi}{6} + 2k\pi \ \text{ou} \ x = -\frac{\pi}{6} + 2k\pi\right\}$

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2. $sen^2\,x - sen\,x = 0$

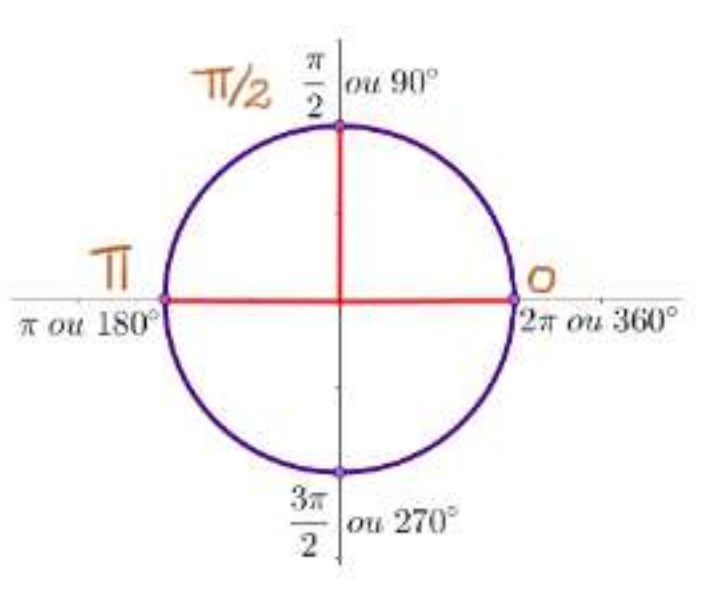
$sen^2 x - sen\,x = 0$

$y = sen\,x$

$y^2 - y = 0$

$y(y - 1) = 0$

$y = 0$ ou $y - 1 = 0 \Rightarrow y = 1$



$sen\,x = 0$

$x = 0 + 2k\pi = 2k\pi$

$x = \pi + 2k\pi = \pi + 2k\pi$

} $x = 0 + k\pi = k\pi$ (a cada meia volta)

$sen\,x = 1$

$x = \pi/2 + 2k\pi$

$S = \left\{x \in \mathbb{R} / \ x = k\pi \ \text{ou} \ x = \frac{\pi}{2} + 2k\pi\right\}$

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3. $2cos^2\,x = 1 - sen\,x$

Sabendo que:

$sen^2 x + cos^2 x = 1$

$cos^2 x = 1 - sen^2 x$

$2cos^2 x = 1 - sen\,x$

$2cos^2 x + sen\,x = 1$

$2 \cdot (1 - sen^2 x) + sen\,x = 1$

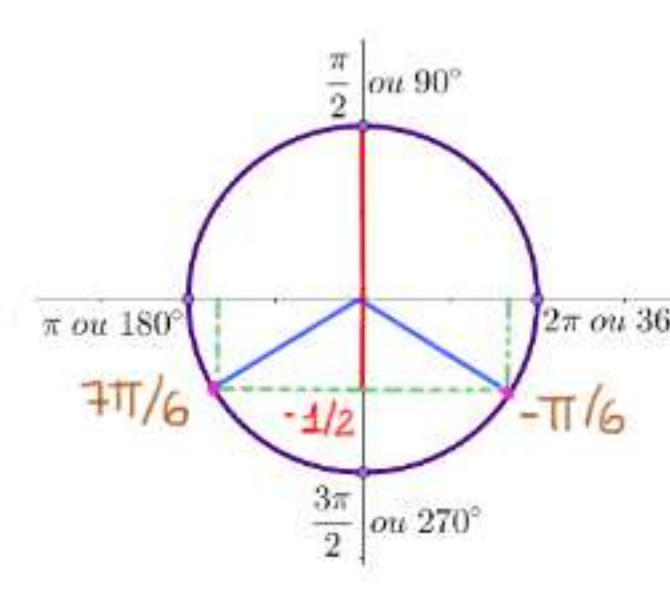
$2 - 2sen^2 x + sen\,x - 1 = 0$

$-2sen^2 x + sen\,x + 1 = 0$

$sen\,x = y$

$-2y^2 + y + 1 = 0$

Da Fórmula de Bhaskara: $y' = 1$ e $y'' = -1/2$



$sen\,x = 1$

$x = \pi/2 + 2k\pi$

$sen\,x = -1/2$

$sen^{-1}(1/2) = 30° \Rightarrow x = \pi/6$

$x = 0 - \pi/6 = -\pi/6 + 2k\pi$

$x = \pi + \pi/6 = (6\pi + \pi)/6 = 7\pi/6 + 2k\pi$

$S = \left\{x \in \mathbb{R} / \ x = \frac{\pi}{2} + 2k\pi \ \text{ou} \ x = -\frac{\pi}{6} + 2k\pi \ \text{ou} \ x = \frac{7\pi}{6} + 2k\pi\right\}$

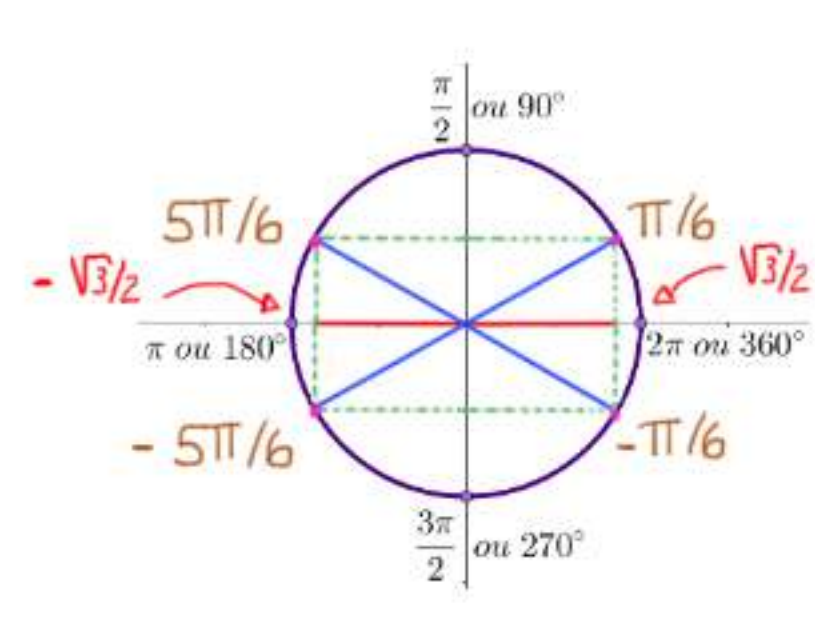
---

4. $4cos^2\,x = 3$

$4cos^2 x = 3$

$cos^2 x = \frac{3}{4}$

$cos\,x = \pm\sqrt{\frac{3}{4}} = \pm\frac{\sqrt{3}}{2}$



$cos\,x = \frac{\sqrt{3}}{2}$

$cos^{-1}(\sqrt{3}/2) = 30° = \pi/6$

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

$x = 0 - \pi/6 = -\pi/6 + 2k\pi$

$cos\,x = -\frac{\sqrt{3}}{2}$

$x = \pi - \pi/6 = (6\pi - \pi)/6 = 5\pi/6 + 2k\pi$

$x = \pi + \pi/6 = (6\pi + \pi)/6 = 7\pi/6 + 2k\pi$ ou $-5\pi/6 + 2k\pi$

$S = \left\{x \in \mathbb{R} / \ x = \pm\frac{\pi}{6} + 2k\pi \ \text{ou} \ x = \pm\frac{5\pi}{6} + 2k\pi\right\}$

---

5. $cos^2\,x + \cos x = 0$

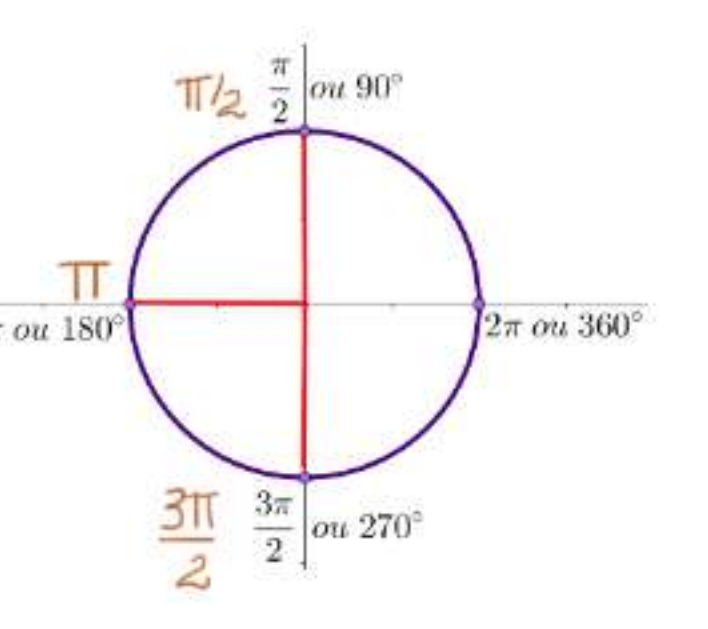
$cos^2 x + cos\,x = 0$

$y = cos\,x$

$y^2 + y = 0$

$y(y + 1) = 0$

$y = 0$ ou $y + 1 = 0 \Rightarrow y = -1$



$cos\,x = 0$

$x = \frac{\pi}{2} + 2k\pi$

$x = \frac{3\pi}{2} + 2k\pi$

} $x = \frac{\pi}{2} + k\pi$ (a cada meia volta)

$cos\,x = -1$

$x = \pi + 2k\pi$

$S = \left\{x \in \mathbb{R} / \ x = \frac{\pi}{2} + k\pi, \ x = \pi + 2k\pi\right\}$

---

6. $sen^2\,x = 1 + \cos x$

Sabendo que:

$sen^2 x + cos^2 x = 1$

$sen^2 x = 1 - cos^2 x$

$sen^2 x = 1 + cos\,x$

$sen^2 x - cos\,x - 1 = 0$

$(1 - cos^2 x) - cos\,x - 1 = 0$

$\cancel{1} - cos^2 x - cos\,x - \cancel{1} = 0$

$-cos^2 x - cos\,x = 0 \quad \times(-1)$

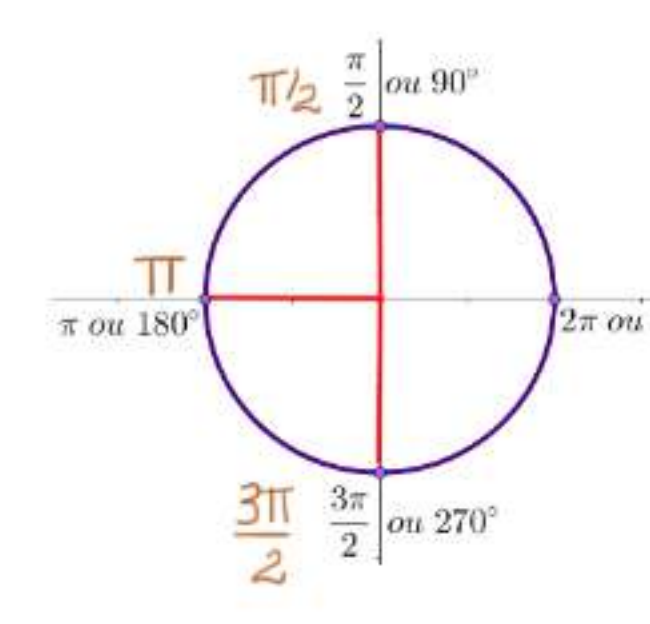
$cos^2 x + cos\,x = 0$

$y = cos\,x$

$y^2 + y = 0$

$y(y + 1) = 0$

$y = 0$ ou $y + 1 = 0 \Rightarrow y = -1$



$cos\,x = 0$

$x = \frac{\pi}{2} + 2k\pi$

$x = \frac{3\pi}{2} + 2k\pi$

} $x = \frac{\pi}{2} + k\pi$ (a cada meia volta)

$cos\,x = -1$

$x = \pi + 2k\pi$

$1 - cos^2\,x = 1 + cos\,x \Longrightarrow cos^2\,x + cos\,x = 0$ e recaímos no anterior.

---

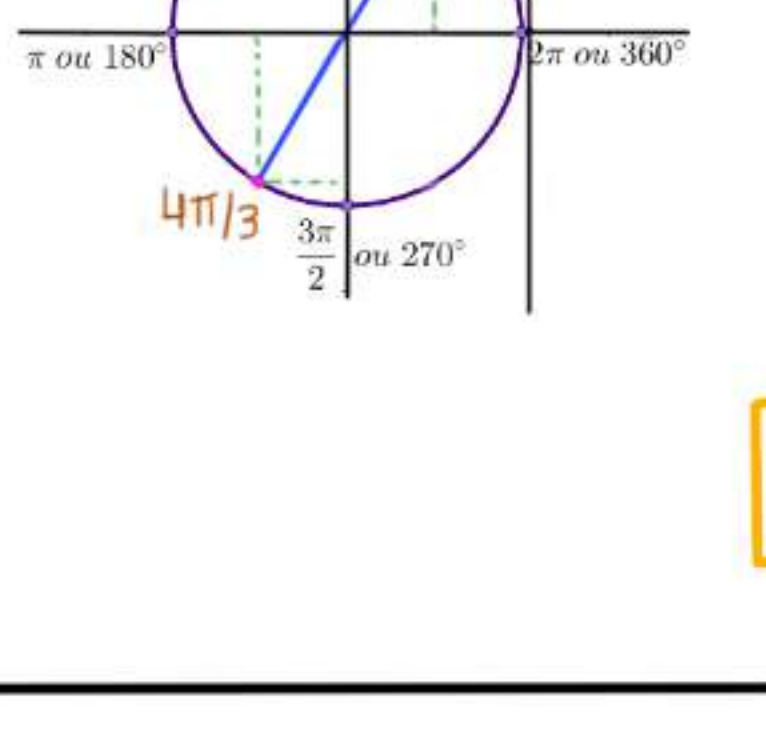
7. $sen\,x - \sqrt{3} \cdot \cos x = 0$

$sen\,x - \sqrt{3} \cdot cos\,x = 0$

$sen\,x = \sqrt{3}\,cos\,x$

$\frac{sen\,x}{cos\,x} = \sqrt{3}$

$tg\,x = \sqrt{3}$



$tg^{-1}(\sqrt{3}) = 60° = \pi/3$

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

$x = \pi + \pi/3 = 4\pi/3 + 2k\pi$

} $x = \pi/3 + k\pi$

$S = \left\{x \in \mathbb{R} / \ x = \frac{\pi}{3} + k\pi\right\}$

---

8. $sen^2\,x = cos^2\,x$

Sabendo que:

$sen^2 x + cos^2 x = 1$

$cos^2 x = 1 - sen^2 x$

$sen^2 x = cos^2 x$

$sen^2 x - cos^2 x = 0$

$sen^2 x - (1 - sen^2 x) = 0$

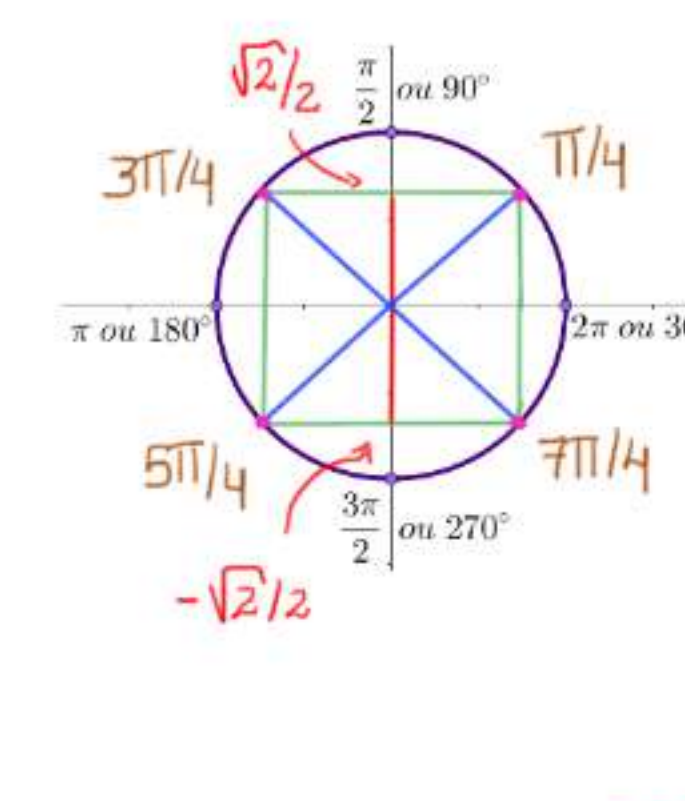
$sen^2 x - 1 + sen^2 x = 0$

$2sen^2 x = 1$

$sen\,x = \pm\sqrt{\frac{1}{2}}$

$sen\,x = \pm\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$sen\,x = \pm\frac{\sqrt{2}}{2}$



$sen\,x = \frac{\sqrt{2}}{2}$

$sen^{-1}(\sqrt{2}/2) = 45° = \pi/4$

$x = \pi/4 + 2k\pi$

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

$+k\pi$ (+ meia volta; + meia volta)

$sen\,x = -\frac{\sqrt{2}}{2}$

$x = \pi + \pi/4 = 5\pi/4 + 2k\pi$

$x = 2\pi - \pi/4 = 7\pi/4 + 2k\pi$

$S = \left\{x \in \mathbb{R} / \ x = \frac{\pi}{4} + k\pi \ \text{ou} \ x = \frac{3\pi}{4} + k\pi\right\}$