Solving trigonometric equations on stated intervals

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. Solve $\sin x = \frac{1}{2}$ on $0 \le x \le 2\pi$. [3 marks]

Use positive sine in quadrantsI andII.

Answer: $\frac{\pi}{6}, \frac{5\pi}{6}$

2. Solve $\cos x = -\frac{\sqrt{2}}{2}$ on $0 \le x \le 2\pi$. [3 marks]

Use reference $\frac{\pi}{4}$ in quadrantsII andIII.

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

3. Solve $\tan x = 1$ on $-\pi \le x \le \pi$. [3 marks]

Tangent repeats after π.

Answer: $-\frac{3\pi}{4}, \frac{\pi}{4}$

4. Solve $\sin(2x) = 0$ on $0 \le x \le 2\pi$. [3 marks]

$2x$ runs from 0 to 4π; its zeros are multiples of π.

Answer: $0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$

5. Solve $2\sin^2 x - \sin x = 0$ on $0 \le x < 2\pi$. [3 marks]

$\sin x(2\sin x - 1) = 0$.

Combine the $\sin x = 0$ and $\sin x = \frac{1}{2}$ roots; exclude 2π.

Answer: $0, \frac{\pi}{6}, \frac{5\pi}{6}, \pi$

6. Solve $\cos(x - \frac{\pi}{4}) = 0$ on $0 \le x \le 2\pi$. [3 marks]

$x - \frac{\pi}{4} = \frac{\pi}{2} + k\pi$; retain the two allowed values.

Answer: $\frac{3\pi}{4}, \frac{7\pi}{4}$