8-5 Solving "more difficult" Trig Equations

Example 1:

Solve $3\tan^2\theta - 1 = 0$ for $0^\circ \leq \theta \leq 360^\circ$.

$3\tan^2\theta = 1$

$\tan^2\theta = \frac{1}{3}$

$\tan\theta = \pm\sqrt{\frac{1}{3}}$

$\tan\theta = \pm\frac{\sqrt{3}}{3}$

Example 2:

Solve $\cot x \cos^2 x = 2\cot x$ for $0 \leq x \leq 2\pi$

$\cot x \cos^2 x - 2\cot x = 0$

$\cot x(\cos^2 x - 2) = 0$

$\cot x = 0$

$90°, 270°$

$\frac{\pi}{2}, \frac{3\pi}{2}$

$\cos^2 x - 2 = 0$

$\cos^2 x = 2$

~~$\cos x = \pm\sqrt{2}$~~

$2\sin^2\theta - 2\sin\theta + \sin\theta - 1$.

Example 3:

Solve $2\sin^2\theta - \sin\theta - 1 = 0$ for $0^\circ \le \theta \le 360^\circ$.

$2x^2 - x - 1$

$2x^2 - 2x + x - 1$

$2x(x-1) + 1(x-1)$

$(2x+1)(x-1)$

$(2\sin\theta + 1)(\sin\theta - 1) = 0$

$2\sin\theta + 1 = 0$ $\qquad$ $\sin\theta = 1$

$2\sin\theta = -1$

$\sin\theta = -\frac{1}{2}$

$210^\circ, 330^\circ$, 90°

Example 4:

$\sin^2 = 1 - \cos^2$

Solve $2\sin^2 x + 3\cos x - 3 = 0$

for $0 \le x \le 2\pi$

$2(1-\cos^2 x) + 3\cos x - 3 = 0$

$2 - 2\cos^2 x + 3\cos x - 3 = 0$

$-2\cos^2 x + 3\cos x - 1 = 0 \quad) \cdot -1$

$2\cos^2 x - 3\cos x + 1 = 0$

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

$2\cos x - 1 = 0$ $\qquad$ $\cos x - 1 = 0$

$\cos x = \frac{1}{2}$ $\qquad$ $\cos x = 1$

~~0~~ $\pi/3$ $\qquad$ $0, 2\pi$

$\pi/3, \frac{5\pi}{3}$

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