6.2. Tria Equations Part I Thursday, April 18, 2019 819 AM

Linear Equations: E.g. $3\tan\theta - \sqrt{3} = 0$ (a) Solve this equation for Θ in $[0^\circ, 360^\circ)$ \rightarrow 3 tan $\theta = \sqrt{3} \rightarrow \tan \theta = \frac{\sqrt{3}}{3}$ (isolate tan θ) → unit circle tells us : $\theta = 30^{\circ}$; 210° (b) Solve for all volutions: 0 = 30° + n. 360° where n = 0; ±1; ±2; ±3;... 0 = 210° + n. 360° where n=0; ±1; ±2; ±3;... E.x. Solve the equation: 2 sin x + 3 = 4 All solutions $On\left[0,2\pi\right)$ $x = \frac{\pi}{6} + n \cdot 2\pi$ $n = 0; \pm 1, \pm 2$ $n = \frac{5\pi}{6} + n \cdot 2\pi$ -> 2 sinx = 1 π/6 ----> -3 $Bin x = \frac{1}{2}$ $x = \frac{\pi}{6}, \frac{5\pi}{6}$

Thursday, April 18, 2019 8:31 AM

Quadratic Equations solved by Root Extraction. E.g. Solve 4 cos x - 1 = 0 (a) On [0°, 360°) $-4 \cos^2 x = 1 \rightarrow \cos^2 x = \frac{1}{4} \rightarrow \cos^2 x = \frac{1}{4} \rightarrow \cos^2 x = \frac{1}{4} \rightarrow \frac{1}{4} = \frac{1}{4} = \frac{1}{4}$ $\frac{120^{\circ}}{2}$ $x = 60^{\circ}, 300^{\circ}$ $\frac{60^{\circ}}{300^{\circ}}$ $x = 120^{\circ}, 240^{\circ}$ (b) All solutions: $x = 60^{\circ} + n \cdot 360^{\circ}; 300^{\circ} + n \cdot 360^{\circ}; 120^{\circ} + n \cdot 360^{\circ};$ 240° + n. 360°; where n= 0, ±1, ±2,... Ex: Solve tan'x - 3 = 0 (a) $O_n [0, 2\pi)$ (b) All solutions Add n. 211 to each of the $stan^2x = 3$ solutions in a + tanx = + 13 $x = \frac{\pi}{3}, \frac{4\pi}{3}, \frac{2\pi}{3}, \frac{5\pi}{3}$ tanx=13 tanx=-13

Thursday, April 18, 2019 8:40 AM

Quadratic by Factoring $E_{.q.} - 2sin^2x = 3sinx + 1.$ a Solve on [0,2π) $O = 2\sin^2 x + 3\sin x + 1$ $0 = (2 \sin x + 1)(\sin x + 1)$ -> 2/1/2 + 1 = 0 or /1/2 + 1 = 0 $Ainx = -\frac{1}{7}$ on Ainx = -1 $x = \frac{3\pi}{2}$ $x = \frac{7\pi}{6}, \frac{11\pi}{6}$ (b) All solutions: Add n. 21 to each of the above. E.x. Solve the given equation on [0°, 360°). (a) $\tan^2 x + \tan x - 2 = 0$ (b) sec2x tan x = 2 tan x

Thursday, April 18, 2019 8:56 AM

(a) $\tan^2 x + \tan x - 2 = 0$ $(\tan x + 2)(\tan x - 1) = 0$ - tanx = 1 on tanx = -2 $x = 45^{\circ}, 225^{\circ}$ $x = -63.435^{\circ}$ Add $360^{\circ} \rightarrow x = 296.565^{\circ}$ Subtract 180° - x = 116.565° b) sec² x tan x = 2 tan x. seizn tanz - 2 tanz = 0 $\tan x \left(\sec^2 x - 2 \right) = 0$ $\tan x = 0$ or $\operatorname{Nec}^2 x - 2 = 0$ $x = 0; 180^{\circ}$ $Aec^{2}x = 2 \rightarrow Aecx = \pm 12$ $Aecx = \sqrt{2}$ $On Aecx = -\sqrt{2}$ $conx = \frac{1}{\sqrt{7}} \quad on \quad conx = -\frac{1}{\sqrt{7}}$ $x = 45^{\circ}, 315^{\circ}$ $x = 135^{\circ}, 225^{\circ}$

Thursday, April 18, 2019 9:03 AM

Use Identities and Factoring. E.g. Solve on [0°, 360°) (a) $2\sin\theta - 1 = \csc\theta$; (b) $5 + 5\tan^2\theta = 6 \sec\theta$ $\frac{Sol: a}{2} = \frac{1}{2}$ $(2\sin\theta - 1)\sin\theta = 1$ $2\sin^2\theta - \sin\theta - 1 = 0$ $(2nin\theta + 1)(sin\theta - 1) = 0$ $\sin\Theta = -\frac{1}{2}$; $\sin\Theta = 1$ $\Theta = 210^{\circ}, 330^{\circ}; 90^{\circ}$ (b) 5 + 5 tan 0 = 6 sec 0 $5(1+\tan^2\theta)=6 \sec\theta$ 5 reco = 6 reco 5 sec 2 - 6 sec 0 = 0; sec 0 (5 sec 0 - 6) = 0 $\operatorname{Aec} \theta = 0$ on $\operatorname{Aec} \theta = \frac{6}{5} - \operatorname{Los} \theta = \frac{5}{6}$ $\frac{1}{1000} - \frac{1}{1000} - \frac{5}{1000} - \frac{5$

Tuesday, April 23, 2019 8:12 AM

Square both rides and use identities: E.g. $\tan x + \sqrt{3} = \sec x$. Solve for $x in [0, 2\pi)$ ____ Square both rides: $(\tan x + \sqrt{3})^2 = \sqrt{2}$ $(\tan x + \sqrt{3})(\tan x + \sqrt{3}) = \sec^2 x$ $\tan^2 x + 2\sqrt{3} \tan x + 3 = \sec^2 x$ Pythagorean Id ten? x + 2/3 tenx + 3 = 1 + ten? x $2\sqrt{3} \tan x = -2$ $\tan x = -\frac{2}{2\sqrt{3}}$ only solution. $\tan x = -\frac{1}{\sqrt{2}}$ $x = \frac{5\pi}{6}, \frac{11\pi}{6}$ Check answers: $x = \frac{11n}{6}$ $x = 5\pi$: $\tan x + \sqrt{3} = \sec x$ tanx + 13 = secx $-\frac{1}{\sqrt{3}}+\sqrt{3}=\frac{2}{\sqrt{3}}$ $\frac{2}{\sqrt{2}} \qquad \qquad \left(-\frac{1}{\sqrt{3}} + \sqrt{3}\right) = \bigcirc \frac{2}{\sqrt{3}}$