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15-Mavzu: $asinx + bcosx = c$ ko`rinishdagi tenglamalar

1 - MASALA

$\mathbf{2}\boldsymbol{sinx}-\mathbf{3}\boldsymbol{cosx}=\mathbf{0}$*tenglamaniyeching.*

Tenglamanicosxgabo`lib, quyidaginiolamiz: $2tgx-3=0, tgx=\frac{3}{2}$,

$$x=arctg\frac{3}{2}+\pi n, \qquad n\in Z$$

Bu masalaniyechisha $2sinx-cosx=0$ *tenglamaningikkalaqismi* $cosx$ *gabo`linadi. Tenglamanino`malum son tarkibidabo`lganifodagabo`lgandaildizlaryo`qolishimumkinliginieslatibo`tamiz. Shuninguchun* $cosx=0$ *tenglamaningildizlariberilgantenglamaningildizlaribo`lishbo`lmasliginitekshiribko`rishkerak. Agar* $cosx=0$ *bo`lsa,* $2sinx-cosx=0$ *tenglamadan* $sinx=0$ *ekanikelibchiqadi. Biroq* $sinx$ *va* $cosx$ *lar* $sin^2x+cos^2x=1$ *tenglikbilanbog`langanligisababliularbirvaqtdanolgatengbo`laolmaydi. Demak,* $asinx+bsinx=0$ *(bunda* $a\neq 0, b\neq 0$*) tenglamani* $cosx$ *(yoki* $sinx$*)*

2 - MASALA

$\boldsymbol{2sinx + cosx = 2}$*tenglamaniyeching.*

$sinx = 2sin\frac{x}{2}cos\frac{x}{2}, cosx = cos^2\frac{x}{2} - sin^2\frac{x}{2}$*formulalardanfoydalanibvatenglamaningo`ngqismini* $2 = 2 \cdot 1 = 2(sin^2\frac{x}{2} + cos^2\frac{x}{2})$*ko`rinishdayozib, quyidaginihosilqilamiz:*

$$4sin\frac{x}{2}cos\frac{x}{2} + cos^2\frac{x}{2} - sin^2\frac{x}{2} = 2sin^2\frac{x}{2} + 2cos^2\frac{x}{2},$$

$$3sin^2\frac{x}{2} - 4sin\frac{x}{2}cos\frac{x}{2} + cos^2\frac{x}{2} = 0.$$

Bu tenglamani$cos^2\frac{x}{2}$*gabo`lib,* $3tg^2\frac{x}{2} - 4tg\frac{x}{2} + 1 = 0$*niolamiz.* $tg\frac{x}{2} = y$*deb belgilab,* $3y^2 - 4y + 1 = 0$*tenglamanihosilqilamiz, bundan*$y_1 = 1, y_2 = \frac{1}{3}$.

1) $tg\frac{x}{2} = 1, \frac{x}{2} = \frac{\pi}{4} + \pi n, x = \frac{\pi}{2} + 2\pi n,\ n \in Z.$

2) $tg\frac{x}{2} = \frac{1}{3}, \frac{x}{2} = arctg\frac{1}{3} + \pi n, x = 2arctg\frac{1}{3} + 2\pi n, n \in Z.$

Javob: $x = \frac{\pi}{2} + 2\pi n, x = 2arctg\frac{1}{3} + 2\pi n, n \in Z.$

3 - MASALA

$\boldsymbol{sin2x - sinx - cosx - 1 = 0}$*tenglamaniyeching.*

$sin2x$ *ni* $sin2x = (sinx + cosx)^2 - 1$ *ayniyatdanfoydalanib,* $sinx + cosx$ *orqaliifodalaymiz.* $sinx + cosx = t$ *deb belgilaymiz, u holda* $sin2x = t^2 - 1$ *vatenglama* $t^2 - t - 2 = 0$ *ko`rinishinioladi, bundan* $t_1 = -1, t_2 = 2$.

1) $sinx + cosx = -1,\ 2sin\frac{x}{2}cos\frac{x}{2} + cos^2\frac{x}{2} - sin^2\frac{x}{2} = -sin^2\frac{x}{2} - cos^2\frac{x}{2},\ 2sin\frac{x}{2}cos\frac{x}{2} + 2cos^2\frac{x}{2} = 0,$

$$cos\frac{x}{2}\left(sin\frac{x}{2} + cos\frac{x}{2}\right) = 0, \qquad cos\frac{x}{2} = 0,$$

$$\frac{x}{2} = \frac{\pi}{2} + \pi n, \qquad x = \pi + 2\pi n, \qquad n \in Z;$$

$$sin\frac{x}{2} + cos\frac{x}{2} = 0, \qquad tg\frac{x}{2} = -1,$$

$$\frac{x}{2} = -\frac{\pi}{4} + \pi n, \qquad x = -\frac{\pi}{2} + 2\pi n, \qquad n \in Z.$$

2) $sinx + cosx = 2$ *tenglamaildizlargaegaemas, chunki* $sinx \le 1,\ cosx \le 1$ *va* $sinx = 1,\ cos = 1$ *tengliklarbirvaqtdabajarilishimumkinemas.*

Javob: $x = \pi + 2\pi n,\ x = -\frac{\pi}{2} + 2\pi n,\ n \in Z.$