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BIKVADRAT TENGLAMALARNI YECHISHNING BIR NECHA USULLARI

Muhammadiyev G‘iyosiddin Jamshid o‘g‘li
Saidnazarov Shohruh Dilshod o‘g‘li
Jo‘raboyev Irisbek Mamarasul o‘g‘li
Abduraximov Jalol O‘ktam o‘g‘li
O‘zMU Jizzax filiali talabasi
Ilmiy rahbar: ***Sharipova Sadoqat Fazliddinovna***
O‘zMU Jizzax filiali katta o‘qituvchisi

Annotatsiya: Bikvadrat tenglamalarni ixcham usulda yechish zarur masalalardan biridir. Ushbu ishda aynan bikvadrat tenglamalarni yechish usullari qaralgan.

Kalit so‘zlar: Bikvadrat tenglamalar, uchinchi darajali simmetrik tenglama, to‘rtinchi darajali simmetrik tenglama

Bikvadrat tenglama. Simmetrik tenglamalar

I. $ax^4+bx^2+c=0$ ko‘rinishidagi tenglama **bikvadrat tenglama** deyiladi. Tenglamani yangi o‘zgaruvchi kiritish usuli bilan yechiladi: $x^2=t$; $x^4=t^2$; $at^2+bt+c=0$

Agar tenglamaning yechimlari $t_1>0$ va $t_2>0$ bo‘lsa, bikvadrat tenglamaning 4 ta ildizi bo‘ladi: $x_1=\sqrt{t_1}\,, x_2=-\sqrt{t_1}\,, x_3=\sqrt{t_2}\,, x_4=-\sqrt{t_2}$. Agar t_1 va t_2 lardan biri manfiy bo‘lsa, 2 ta yoki t=0 da bitta ildizga ega bo‘ladi.

1-misol. $(x^2-7x+2)^2-13(x^2-7x)-26=0$ tenglamani yeching.

Yechish. $x^2-7x=t$ belgilsh kiritamiz.

$$(t+2)^2-13t-26=0$$
$$t^2+4t+4-13t-26=0$$
$$t^2-9t-22=0$$
$$(t-11)(t+2)=0$$
$$t_1=11\,, t_2=-2$$

1-holat $t_1=11$ bo‘lganda

$$x^2-7x-11=0$$

$$D=\sqrt{93}$$

$$x_1=\frac{7-\sqrt{93}}{2}$$
$$x_2=\frac{7+\sqrt{93}}{2}$$

2-holat $t_2=-2$ bo‘lganda

$$x^2-7x+2=0$$

ISSN 2181-3187

$$D = \sqrt{41}$$

$$x_3 = \frac{7-\sqrt{41}}{2} \qquad x_4 = \frac{7-\sqrt{41}}{2}$$

Demak, tenglama butun bo‘lmagan yechimlarga ega ekan:

$$x_1 = \frac{7-\sqrt{93}}{2}\ x_2 = \frac{7+\sqrt{93}}{2}\ x_3 = \frac{7-\sqrt{41}}{2} \qquad x_4 = \frac{7-\sqrt{41}}{2}$$

II. $ax^3+bx^2+bx+a=0;\ a\neq 0$ tenglama **uchinchi darajali simmetrik tenglama** deyiladi.

2-misol. $x^3 - 13x + 12 = 0$ tenglamani yeching.

$$x^3 - x - 12x + 12 = 0$$

$$x(x^2 - 1) - 12(x - 1) = 0$$

$$x(x-1)(x+1) - 12(x-1) = 0$$

$$(x-1)(x^2 + x - 12) = 0$$

$$x_1 = 1, x_2 = -4, x_3 = 3$$

III. $ax^4+bx^3+cx^2\pm bx+a=0;\ a\neq 0$ tenglama **to‘rtinchi darajali simmetrik tenglama** deyiladi.

3-misol. $x^4 - 3x^3 - 2x^2 - 6x - 8 = 0$ tenglamani yeching.

$$x^4 + x^3 - 4x^3 - 2x^2 - 6x - 8 = 0$$

$$x^4 + x^3 - 4x^3 - 4x^2 + 2x^2 - 6x - 8 = 0$$

$$x^4 + x^3 - 4x^3 - 4x^2 + 2x^2 + 2x - 8x - 8 = 0$$

$$x^3(x+1) - 4x^2(x+1) + 2x(x+1) - 8(x+1) = 0$$

$$(x+1)(x^3 - 4x^2 + 2x - 8) = 0$$

$$(x+1)(x^2(x-4) + 2(x-4)) = 0$$

$$(x+1)(x-4)(x^2+2) = 0$$

$$x_1 = -1, x_2 = 4, x_3 = \emptyset$$

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