

30.11.2023 (четверг)

$$A) -3x^4 - 21x^2 - 36 = 0$$

1) Сделаем замену:
 $x^2 = u$

$$3u^2 - 21u - 36 = 0$$

$$D = b^2 - 4ac$$

$$D = 441 - 4 \cdot 3 \cdot 2 = 9$$

$$\sqrt{D} = 3$$

$$N = \frac{-b \pm \sqrt{D}}{2a}$$

$$N_1 = \frac{21 + 3}{-6} = -4$$

$$N_2 = \frac{21 - 3}{-6} =$$

2) Вернемся к замене:

$$\left. \begin{array}{l} x^2 = -4 < 0 \\ x^2 = -3 < 0 \end{array} \right\} \Rightarrow \emptyset$$

$$\text{Б) } x^4 + 4x^2 + 3 = 0$$

Введём ^{об} замену:

$$x_2^2 = T$$

$$T + 4T + 3 = 0$$

$$D = b^2 - 4ac$$

$$D = 16 - 12 = 4$$

$$\sqrt{D} = 2$$

$$T = \frac{-b \pm \sqrt{D}}{2a}$$

$$T_1 = \frac{-4 + 2}{2} = -1$$

$$T_2 = \frac{-4 - 2}{2} = -3$$

$$3) \left(x - \frac{1}{x}\right)^2 - 3\left(x - \frac{1}{x}\right) - 4 = 0;$$

Решим, заменив: $x - \frac{1}{x} = \text{максимум}$

$$\text{максимум}^2 - 3 \text{ максимум} - 4 = 0$$

$$D = b^2 - 4ac$$

$$D = 9 + 16 = 25$$

$$\sqrt{D} = 5$$

$$\text{максимум} = \frac{-b \pm \sqrt{D}}{2a}$$

$$\text{максимум}_1 = \frac{3 + 5}{2} = 4 \quad \text{максимум}_2 = \frac{3 - 5}{2} = -1$$

2) Вернемся к замене:

$$\left[\begin{array}{l} \frac{x^x}{1} \frac{1}{x} = \frac{4^x}{1} \quad \frac{x^2 - 1 - 4x}{x} = 0 \quad / \cdot x \\ \frac{x}{1} \frac{x}{x} \frac{1}{x} = \frac{1}{1} \quad \frac{x^2 - 1 + x}{x} = 0 \quad / \cdot x \end{array} \right.$$

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$x \neq 0$

$$x^2 - 4x - 1 = 0$$

$$D = b^2 - 4ac$$

$$D = 16 + 4 = 20$$

$$\sqrt{D} = \sqrt{20}$$

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

$$x_{1,2} = \frac{4 \pm 2\sqrt{5}}{2}$$

$$2 \pm \sqrt{5}$$

$$x^2 + x - 1 = 0$$

$$D = b^2 - 4ac$$

$$D = 1 + 4 = 5$$

$$\sqrt{D} = \sqrt{5}$$

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

$$x_{1,2} = \frac{-1 \pm \sqrt{5}}{2}$$

$$4) \frac{1}{x^2 + 2x - 3} + \frac{18}{x^2 + 2x + 2} = \frac{18}{x^2 + 2x + 1}$$

Beginn setzen: $x^2 + 2x = a$

$$\frac{1}{a-3} + \frac{18}{a+2} = \frac{18}{a+1}$$

$\swarrow (a+2)(a+1)$ $\swarrow (a-3)(a+1)$ $\swarrow (a-3)(a+2)$

$$a^2 + 3a + 1 + 18a^2 + 18a - 54 - 54 - 18a^2 - 36a + 54a + 108 = 0$$

$$(a-3)(a+2)(a+1)$$

$$a^2 - 15a + 56 = 0$$

$$\begin{cases} a^2 - 15a + 56 = 0 \\ (a-3)(a+2)(a+1) \neq 0 \end{cases}$$

$$a^2 - 15a + 56 = 0$$

$$D = b^2 - 4ac$$

$$D = 225 - 224 = 1$$

$$(a-3)(a+2)(a+1)$$

$$\frac{1}{a-3} + \frac{18}{a+2} = \frac{18}{a+1}$$

$$\frac{a+2+18a-54}{(a-3)(a+2)} = \frac{18}{a+1}$$

OD3

$$a \neq 3; a \neq -2;$$

$$a \neq -1$$

$$(19a-52)(a+1) = 18(a-3)(a+2)$$

$$19a^2 + 19a - 52a - 52 = 18(a^2 + 2a - 3a - 6)$$

$$19a^2 - 33a - 52 = 18a^2 - 18a - 108$$

$$19a^2 - 33a - 52 - 18a^2 + 18a + 108 = 0$$

$$a^2 - 15a + 56 = 0$$

$$\Delta = 225 - 4 \cdot 1 \cdot 56 = 1$$

$$a = \frac{15 \pm 1}{2} = \frac{16}{2} = 8; a = \frac{15 - 1}{2} = 7$$

$$x^2 + 2x = 7$$

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

$$D = 4 + 4 \cdot 8 = 32$$

$$\sqrt{D} = \sqrt{32}$$

$$x = \frac{-2 \pm \sqrt{32}}{2}$$

$$x^2 + 2x = 8$$

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

$$D = 4 - 4 \cdot 1 \cdot (-8) = 4 + 32 = 36$$

$$x = \frac{-2 + 6}{2} = \frac{4}{2} = 2$$

$$x = \frac{-2 - 6}{2} = \frac{-8}{2} = -4$$