06.02.2024 (вторник)

	Вариант 1
1	$\log_2(4-x) = 7$
2	$\log_6(8+x) = 2$
3	$\log_2(2-x) = \log_2 1$
4	$\log_9(9+x) = \log_9 2$
5	$\log_4(x+3) = \log_4(4x-15)$
6	$\log_{\frac{1}{2}}(9-5x) = -3$
7	$\log_5(5-5x) = 2\log_5 2$
8	$\log_5(x^2+4x) = \log_5(x^2+11)$
9	$\log_2(8+7x) = \log_2(8+3x)+1$
10	$\log_{x+1} 49 = 2$
11	$\log_8 2^{8x-4} = 4$

$\log_a b = x$

$b = a^x$

1) $\log_2(4-x) = 7$

$4-x = 2^7$

$4-x = 128$

$4-128 = x$

$-124 = x$

$x = -124$

$4-x = 128$

$-x = 128-4$

$-x = 124$

$x = -124$

$a^{\log_a b} = b$

Свойства логарифмов:

1. $\log_a 1 = 0$
2. $\log_a a = 1$
3. $\log_a bc = \log_a b + \log_a c$
4. $\log_a \frac{b}{c} = \log_a b - \log_a c$
5. $\log_a b^n = n \cdot \log_a b$
6. $\log_{a^k} b = \frac{1}{k} \cdot \log_a b$
7. $\log_{a^k} b^n = \frac{n}{k} \cdot \log_a b$
8. $\log_{a^n} b^n = \log_a b$
10. $\log_a b = \frac{\log_d b}{\log_d a} = \frac{1}{\log_b a}$
11. $\log_a b \cdot \log_b a = 1$
12. $a^{\log_b c} = c^{\log_b a}$

2) $\log_6 (8+x) = 2$

$8 + x = 36$

$x = 28$

3) $\log_2 (2-x) = \log_2 1$

$\log_2 (2-x) = 0$

$2 - x = 1$

$x = 1$

$\log_a 1 = 0$

$\log_a 1 = 0$

4) $\log_9 (9+x) = \log_9 2$

$9 + x = 2$

$x = -7$

$\log_a b = \log_a c$

$b = c$

5) $\log_4 (x+3) = \log_4 (4x-15)$

$x + 3 = 4x - 15$

$x - 4x = -15 - 3$

$-3x = -18$

$x = \frac{-18}{-3} = 6$

$3x = -18$

$x = 6$

6) $\log_{\frac{1}{4}}(9-5x) = -3$

$9-5x = \left(\frac{1}{4}\right)^{-3}$

$9-5x = 64$

$-5x = 55$

$x = -11$

$a^{-n} = \frac{1}{a^n}$

$4^{-3} = \frac{1}{4^3} = \frac{1}{64}$

7) $\log_5(5-5x) = 2 \cdot \log_5 2$

$2 \cdot \log_5 2 = \log_5 2^2 = \log_5 4$

$5-5x = 4$

$-5x = -1$

$x = 0{,}2$

8) $\log_5(x^2+4x) = \log_5(x^2+11)$

$x^2 + 4x = x^2 + 11$

$x^2 - x^2 + 4x = 11$

$4x = 11$

$x = \frac{11}{4} = 2{,}75$

9) $\log_2(8+7x) = \log_2(8+3x) + 1$

$\log_2(8+3x) + \log_2 2$

$\log_2(8+3x) \cdot 2 = \log_2(16+6x)$

$8 + 7x = 16 + 6x$

$x = 8$

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10) $\log_{x+1} 49 = 2$

$49 = (x+1)^2$

$(x+1)^2 = x^2+1$

$(x+1)^2 = x^2 + 2x + 1$

$(a+b)^2 = a^2 + 2ab + b^2$

$x^2 + 2x + 1 = 49$

$x^2 + 2x + 1 - 49 = 0$

$x^2 + 2x - 48 = 0$

$D = 4 + 192 = 196 = 14^2$

$x_1 = \frac{-2+14}{2} = 6$

$x_2 = \frac{-16}{2} = -8$

11) $\log_8 2^{8x-4} = 4$

$(8x-4) \cdot \log_8 2 = 4$

$\log_8 2 = \log_{2^3} 2$

$\frac{1}{3} \cdot \log_2 2 = \frac{1}{3}$

$(8x-4) \cdot \frac{1}{3} = 4$

$8x-4 = 4 : \frac{1}{3}$

$8x-4 = 4 \cdot 3$

$8x-4 = 12$

$8x = 16$

$x = 2$