

Key

1. $\log_2(2x + 1) = 3$

$2^3 = 2x + 1$

$8 = 2x + 1$

$7 = 2x$

$x = 7/2$

2. $\log_3(x^2 + 1) = 2$

$x^2 + 1 = 3^2$

$x^2 - 8 = 0$

$x^2 = 8$

$x = \pm 2\sqrt{2}$

3. $\frac{1}{2}\log_3(x) = 2\log_3(2)$

$\log_3 x^{1/2} = \log_3 2^2$

$x^{1/2} = 4$

$x = 16$

(square both sides)

4. $\log_2(x - 1) + \log_2 4 = 5$

$\log_2 4x - 4 = 5$

$4x - 4 = 32$

$4x = 36$

$x = 9$

5. $\log_3(x - 1)^2 = 2$

$(x - 1)^2 = 3^2$

$x^2 - 2x + 1 = 9$

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

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

$x = 4$ $x = -2$

Both work

6. $\ln(x) = 10$

$e^{10} = x$

$22026.47 = x$

7. $\ln(2 + x) = 1$

$2 + x = e^1$

$2 + x = 2.718$

$x = 0.718$

8. $\log(2 + x) = 1$

$2 + x = 10^1$

$x = 8$

9. $\log(x - 4) = 3$

$x - 4 = 10^3$

$x = 1004$

10. $\log(3x + 5) = 2$

$3x + 5 = 10^2$

$3x + 5 = 100$

$3x = 95$

$x = \frac{95}{3}$

11. $\log_3(2 - x) = 3$

$2 - x = 27$

$-x = 25$

$x = -25$

12. $\log_2(x^2 - x - 2) = 2$

$x^2 - x - 2 = 2^2$

$x^2 - x - 6 = 0$

$(x - 3)(x + 2) = 0$

$x = 3$ $x = -2$

Both work

13. $2 - \ln(3 - x) = 0$

$$\ln(3-x) = -2$$

$$3-x = e^{-2}$$

$$3-x = 7.389$$

$$-x = 4.389$$

$$\boxed{x = -4.389}$$

14. $\log_2 3 + \log_2 x = \log_2 5 + \log_2(x - 2)$

$$\log_2 3x = \log_2 (5x-10)$$

$$3x = 5x - 10$$

$$-2x = -10$$

$$\boxed{x = 5}$$

15. $2 \log(x) = \log 2 + \log(3x - 4)$

$$\log x^2 = \log(6x-8)$$

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

$$(x-2)(x-4) = 0$$

$$\boxed{x=2} \quad \boxed{x=4}$$

16. $\log(x) + \log(x - 1) = \log(4x)$

$$\log(x^2 - x) = \log(4x)$$

$$x^2 - x = 4x$$

$$x^2 - 5x = 0$$

$$x(x-5) = 0$$

$$\boxed{x=0} \quad \boxed{x=5}$$

17. $\log_5 x + \log_5(x + 1) = \log_5 20$

$$\log_5(x^2 + x) = \log_5 20$$

$$x^2 + x - 20 = 0$$

$$(x+5)(x-4) = 0$$

$$x = -5 \quad \boxed{x=4}$$

(Doesn't work)

18. $\log_5(x + 1) - \log_5(x - 1) = 2$

$$\log_5\left(\frac{x+1}{x-1}\right) = 2$$

$$\frac{x+1}{x-1} = 5^2$$

$$x+1 = 25x-25$$

$$26 = 24x$$

$$\boxed{x = \frac{13}{12}}$$

19. $\log(x) + \log(x - 3) = 1$

$$\log(x^2 - 3x) = 1$$

$$x^2 - 3x = 10^1$$

$$x^2 - 3x - 10 = 0$$

$$(x-5)(x+2) = 0$$

$$\boxed{x=5} \quad x = -2$$

(doesn't work)

20. $\log_9(x - 5) + \log_9(x + 3) = 1$

$$\log_9(x^2 - 2x - 15) = 1$$

$$x^2 - 2x - 15 = 9^1$$

$$x^2 - 2x - 24 = 0$$

$$(x-6)(x+4) = 0$$

$$\boxed{x=6} \quad x = -4 \text{ (Does not work)}$$