(8) $3^{x+2} = 7 \quad | \ln$

$(x+2)\ln 3 = \ln 7 \quad | \div \ln 3$

$x+2 = \frac{\ln 7}{\ln 3} \quad | -2$

$x = \frac{\ln 7}{\ln 3} - 2 \qquad S = \left\{ \frac{\ln 7}{\ln 3} - 2 \right\}$

(9) $8e^{2x} = 20 \quad | \div 8$

$e^{2x} = \frac{5}{2} \quad | \ln$

$2x = \ln 5 - \ln 2 \quad | \cdot \frac{1}{2}$

$x = \frac{1}{2}(\ln 5 - \ln 2)$

$S = \left\{ \frac{1}{2}(\ln 5 - \ln 2) \right\}$

(10) $e^{3-2x} = 4 \quad | \ln$

$3 - 2x = \ln 4 \quad | -3$

$-2x = \ln 4 - 3 \quad | \cdot \left(-\frac{1}{2}\right)$

$x = -\frac{1}{2}(\ln 4 - 3)$

$S = \left\{ \frac{1}{2}(3 - \ln 4) \right\}$

(11) $3x^2e^x + x^3e^x = 0$

$x^2e^x(3+x) = 0$

$x = 0$ ✓ $\quad x = 0$ ✗ $\quad x = -3$ ✓

$S = \{-3, 0\}$

(12) $4^{1-2x} = 2$

$2^{2-4x} = 2^1 \quad | \log_2$

$2 - 4x = 1 \quad | -2$

$-4x = -1 \quad | \cdot (-\frac{1}{4})$

$x = \frac{1}{4}$ $\quad S = \{-\frac{1}{4}\}$

(13) $8^{6+3x} = 4$

$2^{18+9x} = 2^2 \quad | \log_2$

$18 + 9x = 2 \quad | -18$

$9x = -16 \quad | \cdot \frac{1}{9}$

$x = -\frac{16}{9}$ $\quad S = \{-\frac{16}{9}\}$

(14) $3^{x^2+x} = \sqrt{3}$

$3^{x^2+x} = 3^{\frac{1}{2}} \quad | \log_3$

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

$x^2 + x - \frac{1}{2} = 0$

$x_{1,2} = \frac{-1 \mp \sqrt{1+2}}{2} = -\frac{1}{2} \mp \frac{\sqrt{3}}{2}$

$S = \left\{ -\frac{1}{2} - \frac{\sqrt{3}}{2}, -\frac{1}{2} + \frac{\sqrt{3}}{2} \right\}$

(15) $4^{x-x^2} = \frac{1}{2}$

$2^{2x-2x^2} = 2^{-1} \quad | \log_2$

$2x - 2x^2 = -1$

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

$x_{1,2} = \frac{2 \mp \sqrt{4+8}}{4} = \frac{2 \mp 2\sqrt{3}}{2 \cdot 2} =$

$\frac{1}{2} \mp \frac{\sqrt{3}}{2} \quad S = \left\{ \frac{1}{2} - \frac{\sqrt{3}}{2}, \frac{1}{2} + \frac{\sqrt{3}}{2} \right\}$

(16) $\log_x 64 = -3 \quad | \; x^{\square}$

$64 = x^{-3}$

$2^6 = x^{-3}$

$(2^{-2})^{-3} = x^{-3}$

$2^{-2} = x$

$x = \frac{1}{4}$ $\quad S = \{\frac{1}{4}\}$

(17) $\log_{\sqrt{2}} x = -6 \quad | \; \sqrt{2}^{\square}$

$x = (\sqrt{2})^{-6}$

$x = (2^{\frac{1}{2}})^{-6} = 2^{-3} = \frac{1}{8}$ $\quad S = \{\frac{1}{8}\}$

(18) $5^x = 3^{x+2} \quad | \ln$

$x \ln 5 = (x+2) \ln 3$ $\quad S = \{\frac{2\ln 3}{\ln 5 - \ln 3}\}$

$x \ln 5 - x \ln 3 = 2 \ln 3$

$x = \frac{2\ln 3}{\ln 5 - \ln 3} \approx 4.301$

(19) $5^{x+2} = 7^{x-2} \quad | \ln$

$(x+2)\ln 5 = (x-2)\ln 7$

$x(\ln 5 - \ln 7) = (-2)(\ln 7 + \ln 5)$

$x = \dfrac{2(\ln 7 + \ln 5)}{\ln 7 - \ln 5} \approx 21.133$

$S = \left\{ 2\,\dfrac{\ln 7 + \ln 5}{\ln 7 - \ln 5} \right\}$

(20) $9^{2x} = 27^{3x-4}$

$3^{4x} = 3^{9x-12} \quad | \log_3$

$4x = 9x - 12$

$-5x = -12$

$x = \frac{12}{5} \qquad S = \left\{ \frac{12}{5} \right\}$

(21) $25^{2x} = 5^{x^2-12}$

$5^{4x} = 5^{x^2-12} \quad | \log_5$

$4x = x^2 - 12$

$x^2 - 4x - 12 = 0 \qquad S = \{-2, 6\}$

$(x-6)(x+2) = 0$

(22) $\log_3 \sqrt{x-2} = 2 \quad | \,3^{\square}$

$\sqrt{x-2} = 9 \quad | \,\square^2$!

$x-2 = 81$

$x = 83$ (ok)

$S = \{83\}$

(23) $2^{x+1} \cdot 8^{-x} = 4$

$2^{x+1} \cdot (2^3)^{-x} = 4$

$2^{x+1} \cdot 2^{-3x} = 4$

$2^{x+1-3x} = 4$

$2^{1-2x} = 2^2 \quad | \log_2$

$1-2x = 2$

$-2x = 1$

$x = -\frac{1}{2}$

$S = \{-\frac{1}{2}\}$

(24) $8 = 4^{x^2} \cdot 2^{5x}$

$2^3 = 2^{2x^2} \cdot 2^{5x}$

$2^3 = 2^{2x^2+5x} \quad | \log_2$

$3 = 2x^2 + 5x$

$2x^2 + 5x - 3 = 0$

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

$S = \left\{-3, \frac{1}{2}\right\}$

(25) $2^x \cdot 5 = 10^x$

$5 = \frac{10^x}{2^x}$

$5 = 5^x \quad | \log_5$

$x = 1$

$S = \{1\}$

(26) $\log_6(x+3) + \log_6(x+4) = 1$

$\log_6(x+3)(x+4) = 1 \quad | \; 6^{\square}$

$x^2 + 7x + 12 = 6$

$x^2 + 7x + 6 = 0$

$(x+6)(x+1) = 0$

-6 is not a solution

$S = \{-1\}$

(27) $\log(7x-12) = 2\log x$

$\log(7x-12) = \log x^2 \quad | \; 10^{\square}$

$7x - 12 = x^2$

$x^2 - 7x + 12 = 0$

$(x-3)(x-4) = 0$

$S = \{3, 4\}$

(28) $e^{1-x} = 5 \quad | \ln$

$1-x = \ln 5$

$x = 1-\ln 5$

$S = \{1-\ln 5\}$

(29) $e^{1-2x} = 4 \quad | \ln$

$1-2x = \ln 4$

$-2x = \ln 4 - 1$

$x = -\frac{1}{2}(\ln 4 - 1) = \frac{1}{2}(1-\ln 4)$

$S = \left\{\frac{1}{2}(1-\ln 4)\right\}$

(30) $2^{3x} = 3^{2x+1} \quad | \ln$

$3x\ln 2 = (2x+1)\ln 3$

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

$x = \dfrac{\ln 3}{\ln 8 - \ln 9}$

$S = \left\{\dfrac{\ln 3}{\ln 8 - \ln 9}\right\}$

(31) $2^{x^3} = 3^{x^2} \quad | \ln$

$x^3 \ln 2 = x^2 \ln 3$

$x^2(x \ln 2 - \ln 3) = 0$

$x = 0$ $\qquad$ $x = \frac{\ln 3}{\ln 2}$

$S = \left\{0, \frac{\ln 3}{\ln 2}\right\}$

(32) $2^{\frac{2}{\log_5 x}} = \frac{1}{16} = 2^{-4} \quad | \log_2$

$\frac{2}{\log_5 x} = -4$

$2 = -4 \log_5 x$

$-\frac{1}{2} = \log_5 x \quad | 5^{\square}$

$\frac{1}{\sqrt{5}} = x$

$S = \left\{\frac{1}{\sqrt{5}}\right\}$

(33) $e^{2x} - e^x - 6 = 0$

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

$x = \ln 3$ $\qquad$ $\times$

$S = \{\ln 3\}$