

$$51. \log_2(1-x) = 4 \Leftrightarrow 1-x = 2^4 \Leftrightarrow x = 1 - 2^4 = -15$$

$$53. 5^{5-3x} = 26 \Leftrightarrow \log_5 26 = 5 - 3x \Leftrightarrow 3x = 5 - \log_5 26 \Leftrightarrow x = \frac{1}{3}(5 - \log_5 26) \approx 0.99$$

$$55. e^{3x/4} = 10 \Leftrightarrow \ln e^{3x/4} = \ln 10 \Leftrightarrow \frac{3x}{4} = \ln 10 \Leftrightarrow x = \frac{4}{3} \ln 10 \approx 3.07$$

$$57. \log x + \log(x+1) = \log 12 \Leftrightarrow \log[x(x+1)] = \log 12 \Leftrightarrow x(x+1) = 12 \Leftrightarrow x^2 + x - 12 = 0 \Leftrightarrow (x+4)(x-3) = 0 \Rightarrow x = 3 \text{ or } -4. \text{ Because } \log x \text{ and } \log(x+1) \text{ are undefined at } x = -4, \text{ it follows that } x = 3 \text{ is the only solution.}$$

$$59. x^2 e^{2x} + 2x e^{2x} = 8 e^{2x} \Leftrightarrow e^{2x}(x^2 + 2x - 8) = 0 \Leftrightarrow x^2 + 2x - 8 = 0 \text{ (since } e^{2x} > 0 \text{ for all } x) \Leftrightarrow (x+4)(x-2) = 0 \Leftrightarrow x = 2, -4$$

$$61. 5^{-2x/3} = 0.63 \Leftrightarrow \frac{-2x}{3} \log 5 = \log 0.63 \Leftrightarrow x = -\frac{3 \log 0.63}{2 \log 5} \approx 0.430618$$

$$63. 5^{2x+1} = 3^{4x-1} \Leftrightarrow (2x+1)\log 5 = (4x-1)\log 3 \Leftrightarrow 2x \log 5 + \log 5 = 4x \log 3 - \log 3 \Leftrightarrow x(2 \log 5 - 4 \log 3) = -\log 3 - \log 5 \Leftrightarrow x = \frac{\log 3 + \log 5}{4 \log 3 - 2 \log 5} \approx 2.303600$$