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

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

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

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

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