

$$34. \ln(2+x) = 1 \Leftrightarrow 2+x = e^1 \Leftrightarrow x = e - 2 \approx 0.7183$$

$$36. \log(x-4) = 3 \Leftrightarrow x-4 = 10^3 = 1000 \Leftrightarrow x = 1004$$

$$38. \log_3(2-x) = 3 \Leftrightarrow 2-x = 3^3 = 27 \Leftrightarrow -x = 25 \Leftrightarrow x = -25$$

$$40. \log_2(x^2 - x - 2) = 2 \Leftrightarrow x^2 - x - 2 = 2^2 = 4 \Leftrightarrow x^2 - x - 6 = 0 \Leftrightarrow (x-3)(x+2) = 0 \Leftrightarrow x = 3 \text{ or } x = -2. \text{ Thus the solutions are } x = 3 \text{ and } x = -2.$$

$$42. 2 \log x = \log 2 + \log(3x-4) \Leftrightarrow \log(x^2) = \log(6x-8) \Leftrightarrow x^2 = 6x-8 \Leftrightarrow x^2 - 6x + 8 = 0 \Leftrightarrow (x-4)(x-2) = 0 \Leftrightarrow x = 4 \text{ or } x = 2. \text{ Thus the solutions are } x = 4 \text{ and } x = 2.$$

$$44. \log_5 x + \log_5(x+1) = \log_5 20 \Leftrightarrow \log_5(x^2 + x) = \log_5 20 \Leftrightarrow x^2 + x = 20 \Leftrightarrow x^2 + x - 20 = 0 \Leftrightarrow (x+5)(x-4) = 0 \Leftrightarrow x = -5 \text{ or } x = 4. \text{ Since } \log_5(-5) \text{ is undefined, the only solution is } x = 4.$$

$$46. \log x + \log(x-3) = 1 \Leftrightarrow \log[x(x-3)] = 1 \Leftrightarrow x^2 - 3x = 10 \Leftrightarrow x^2 - 3x - 10 = 0 \Leftrightarrow (x+2)(x-5) = 0 \Leftrightarrow x = -2 \text{ or } x = 5. \text{ Since } \log(-2) \text{ is undefined, the only solution is } x = 5.$$

$$48. \ln(x-1) + \ln(x+2) = 1 \Leftrightarrow \ln[(x-1)(x+2)] = 1 \Leftrightarrow x^2 + x - 2 = e \Leftrightarrow x^2 + x - (2+e) = 0 \Rightarrow x = \frac{-1 \pm \sqrt{1+4(2+e)}}{2} = \frac{-1 \pm \sqrt{9+4e}}{2}. \text{ Since } x-1 < 0 \text{ when } x = \frac{-1 - \sqrt{9+4e}}{2}, \text{ the only solution is } x = \frac{-1 + \sqrt{9+4e}}{2} \approx 1.7290$$