1. Solve for x in the following equations.

   (a) $3^x = 3^2$

   (b) $5^{2x} = 25$

   (c) $7^{2x+3} = 1$

   (d) $2^{x^2} = 16$

   (e) $10^{2x+1} = \dfrac{1}{10}$

   (f) $4^{2x-3} = 4^{6+5x}$

   (g) $2^{x^3-x} = 1$

   (h) $5^{x^2-1} = 5^{1-x^2}$

   (i) $2^{4x} = 8$

   (j) $2^{3x} = 32$

   (k) $5^{2x-1} = 125$

   (l) $4^{2x} = \dfrac{1}{2}$

2. Solve for x. Your answer should be expressed in terms of the natural logarithm.

   (a) $3^{2x} = 5$

   (b) $5^{-x} = 2$

   (c) $e^{2x} = 2e^x$

   (d) $e^{-2x} = \dfrac{1}{2}$

   (e) $5^{1-x} = 7^x$

   (f) $2^x = 3^{x+1}$

   (g) $2^{-\frac{x}{10}} = 5$

   (h) $6^{2x+1} = 5^x$

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

   (j) $3e^x = 7$

   (k) $2e^{4x} = 14$

   (l) $e^{1-5x} = 2$

   (m) $e^{2-5x} = 9$

   (n) $e^{5x} = 1$

   (o) $2 + e^{5x+1} = 8$

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

   (q) $2e^{1-x} + 3 = 7$

   (r) $3e^{2x+1} - 5 = 1$

   (s) $6e^{x/10} - 4 = 5$

   (t) $e^{2\ln x} = 9$

3. Find the inverse of the following functions.

   (a) $y = 4^x$

   (b) $y = 6^{2x}$

   (c) $y = 5^x - 2$

   (d) $y = 6^x + 4$

   (e) $y = 2^{3x-5}$

   (f) $y = 5^{4x+1}$

   (g) $y = e^{x-2}$

   (h) $y = e^{6x+2}$

   (i) $y = 5e^{2x}$

   (j) $y = e^{2x-3} + 2$

   (k) $y = 4e^{x-3} - 5$

   (l) $y = 2e^{x+3} + 4$

Answers

1. (a) $x = 2$ (b) $x = 1$ (c) $x = -3/2$ (d) $x = \pm 2$

  (e) $x = -1$ (f) $x = -3$ (g) $x = 0, 1, -1$ (h) $x = \pm 1$

  (i) $x = \dfrac{3}{4}$ (j) $x = 5/3$ (k) $x = 2$ (l) $x = -\dfrac{1}{4}$

2. (a) $x = \dfrac{\ln 5}{2 \ln 3}$ (b) $x = -\dfrac{\ln 2}{\ln 5}$ (c) $x = \ln 2$ (d) $x = \dfrac{\ln 2}{2}$

  (e) $x = \dfrac{\ln 5}{\ln 5 + \ln 7}$ (f) $x = \dfrac{\ln 3}{\ln 2 - \ln 3}$ (g) $x = \dfrac{-10 \ln 5}{\ln 2}$ (h) $x = \dfrac{-\ln 6}{\ln 36 - \ln 5}$

  (i) $x = -\dfrac{\ln 6}{2}$ (j) $x = \ln 7 - \ln 3$ (k) $x = \dfrac{\ln 7}{4}$ (l) $x = \dfrac{1 - \ln 2}{5}$

  (m) $x = \dfrac{2 - \ln 9}{5}$ (n) $x = 0$ (o) $x = \dfrac{\ln 6 - 1}{5}$ (p) $x = \dfrac{1 - \ln 8}{2}$

  (q) $x = 1 - \ln 2$ (r) $x = \dfrac{\ln 2 - 1}{2}$ (s) $x = 10 \ln 3 - 10 \ln 2$ (t) $x = \pm 3$

3. (a) $y = \log_4 x$ (b) $y = \dfrac{\log_6 x}{2}$ (c) $y = \log_5 (x + 2)$

  (d) $y = \log_6 (x - 4)$ (e) $y = \dfrac{\log_2 x + 5}{3}$ (f) $y = \dfrac{\log_5 x - 1}{4}$

  (g) $y = \ln x + 2$ (h) $y = \dfrac{\ln x - 2}{6}$ (i) $y = \dfrac{1}{2} \ln \left(\dfrac{x}{5} \right)$

  (j) $y = \dfrac{\ln(x - 2) + 3}{2}$ (k) $y = \ln \left(\dfrac{x + 5}{4} \right) + 3$ (l) $y = \ln \left(\dfrac{x - 4}{2} \right) - 3$