

1. a. Find the inverse of: $f(x) = \frac{x}{x+1}$
- b. Verify that $f(f^{-1}(x)) = x$
- c. What is the domain and range of $f(x)$?
- d. What is the domain and range of $f^{-1}(x)$?

2. Find the domain of: $\log\left(\frac{2x-1}{(x+2)^2}\right)$.

3. a. Write $5^{2x} = 3y$ in logarithmic notation.
- b. Write $\log_b 5y = 2a$ in exponential notation.

4. Express in terms of sums and differences of logarithms.

a. $\ln\left(\frac{2}{3x^3y^2}\right)$

b. $\log_a \sqrt[3]{\frac{y^2z^3}{x^3}}$

5. Express as a single logarithm and if possible simplify

a. $5 \log_b x + \frac{1}{2} \log_b y - 4 \log_b z$

6. Solve the following exponential equations.

a. $5^{x^2-2x} = 5^{4x}$

b. $9^{2x-5} = 27^{4x+1}$

c. $e^{3x-1} = 2$

d. $3^{2x-1} = 5$

7. Find the domain of the solution set and solve the following equations for x.

a. $\ln(5x+8) = 4$

b. $\log_{(x+2)} 81 = 2$

c. $\log_4(x+3) + \log_4(x-3) = 2$

d. $\log(x+3) - \log(x-2) = 2$

8. Solve the following problems for x --- Note: think substitution!

a. $3^{2x} - 3^x - 6 = 0$

b. $(\log_2(x+4))^2 - 4 \log_2(x+4) + 3 = 0$

Ch 4 Rev. Answers

① a) $f^{-1}(x) = \frac{x}{1-x}$

b) $f(f^{-1}(x)) = x$

c) $D_f: \mathbb{R}; x \neq -1$

$R_f: \mathbb{R}; y \neq 1$

d) $D_{f^{-1}}: \mathbb{R}; x \neq 1$

$R_{f^{-1}}: \mathbb{R}; y \neq -1$

② $(\frac{1}{2}, \infty)$

③ a) $\log_5 3y = 2x$

b) $b^{2a} = 5-y$

④ a) $\ln(2) - \ln 3 - 3 \ln x - 2 \ln y$

b) $\frac{2}{3} \log_a y + \log_a z - \log_a x$

⑤ $\log_a \left[\frac{x^5 y^{\frac{1}{2}}}{z^4} \right]$

⑥ a) $x=0$ $x=6$

b) $x = -\frac{13}{8}$

c) $x = \frac{1 + \ln(2)}{3}$

d) $x = \frac{\log 5 + \log 3}{2 \log 3}$

7 a) Domain: $x > -\frac{8}{5}$

$x = \frac{e^4 - 8}{5}$

b) Domain $x > -2$
 $x = 7$

c) Domain: $x > 3$
 $x = 5$

d) Domain: $x > 2$
 $x = \frac{203}{99}$

8 a) $x = 1$

b) $x = 4$ $x = -2$

domain $x > -4$