

More problems for section 2.8 of *Essentials of Precalculus with Calculus Previews* by Zill and Dewar, 6e.

additional source: Rohn England

When finding the inverse function, remember that the range of f is the domain of f^{-1} and the range of f^{-1} is the domain of f .

1. Find $f^{-1}(x)$ and the domain and range of f^{-1} .

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|---------------------------------------|-------------------------------|-------------------------------|
| a. $f(x) = 14 + 2x$ | b. $f(x) = 5x + 2(1 - x)$ | c. $f(x) = -x - 4$ |
| d. $f(x) = \frac{x+1}{x}$ | e. $f(x) = \frac{1}{1+x}$ | f. $f(x) = \frac{2-3x}{x+1}$ |
| g. $f(x) = \frac{x}{x-2}$ | h. $f(x) = \frac{2-x}{5}$ | i. $f(x) = 1 - \frac{1}{x+7}$ |
| j. $f(x) = \frac{x+2}{x}$ | k. $f(x) = \frac{3x-1}{2+x}$ | l. $f(x) = \frac{5x-7}{4+x}$ |
| m. $f(x) = \frac{3x+2}{5x+7}$ | n. $f(x) = \frac{2x-1}{3x+5}$ | o. $f(x) = x^3 + 2$ |
| p. $f(x) = x^3 - 2$ | q. $f(x) = \frac{1}{x^3+8}$ | r. $f(x) = \sqrt[3]{2+3x^5}$ |
| s. $f(x) = \sqrt[5]{\frac{2x-1}{7x}}$ | t. $f(x) = (x-2)^{5/3} + 1$ | u. $f(x) = (x+4)^{7/9} - 3$ |
| v. $f(x) = (3-x)^{-5/9} + 4$ | w. $f(x) = (4-x)^{-7/3} - 5$ | x. $f(x) = (x+8)^{-9/5} + 6$ |

2. Find $f^{-1}(x)$ and the domain and range of f^{-1} .

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|--------------------------|----------------------------------|-----------------------------------|
| a. $f(x) = \sqrt{x-5}$ | b. $f(x) = 3\sqrt{x+7}$ | c. $f(x) = \frac{2}{\sqrt{x+3}}$ |
| d. $f(x) = \sqrt{1-x^3}$ | e. $f(x) = \frac{1}{\sqrt{x+2}}$ | f. $f(x) = \frac{-1}{\sqrt{x+2}}$ |

Answers

1a. $f^{-1}(x) = \frac{1}{2}x - 7$; dom = range = (∞, ∞) . 1b. $f^{-1}(x) = \frac{x-2}{3}$; dom = range = (∞, ∞) . 1c. $f^{-1}(x) = -x - 4$; dom = range = (∞, ∞) . 1d. $f^{-1}(x) = \frac{1}{x-1}$; dom = $(-\infty, 1) \cup (1, \infty)$, range = $(-\infty, 0) \cup (0, \infty)$. 1e. $f^{-1}(x) = \frac{1-x}{x}$; dom = $(-\infty, 0) \cup (0, \infty)$, range = $(-\infty, -1) \cup (-1, \infty)$. 1f. $f^{-1}(x) = \frac{2-x}{x+3}$; dom = $(-\infty, -3) \cup (-3, \infty)$, range = $(-\infty, -1) \cup (-1, \infty)$. 1g. $f^{-1}(x) = \frac{2x}{x-1}$; dom = $(-\infty, 1) \cup (1, \infty)$, range = $(-\infty, 2) \cup (2, \infty)$. 1h. $f^{-1}(x) = 2 - 5x$; dom = range = (∞, ∞) . 1i. $f^{-1}(x) = \frac{7x-6}{1-x}$; dom = $(-\infty, 1) \cup (1, \infty)$, range = $(-\infty, -7) \cup (-7, \infty)$. 1j. $f^{-1}(x) = \frac{2}{x-1}$; dom = $(-\infty, 1) \cup (1, \infty)$, range = $(-\infty, 0) \cup (0, \infty)$. 1k. $f^{-1}(x) = \frac{2x+1}{3-x}$; dom = $(-\infty, 3) \cup (3, \infty)$, range = $(-\infty, -2) \cup (-2, \infty)$. 1l. $f^{-1}(x) = \frac{4x+7}{5-x}$; dom = $(-\infty, 5) \cup (5, \infty)$, range = $(-\infty, -4) \cup (-4, \infty)$. 1m. $f^{-1}(x) = \frac{7x-2}{-5x+3}$; dom = $(-\infty, 3/5) \cup (3/5, \infty)$, range = $(-\infty, -7/5) \cup (-7/5, \infty)$. 1n. $f^{-1}(x) = \frac{5x+1}{2-3x}$; dom = $(-\infty, 3/2) \cup (3/2, \infty)$, range = $(-\infty, -5/3) \cup (-5/3, \infty)$. 1o. $f^{-1}(x) = \sqrt[3]{x-2}$; dom = range = (∞, ∞) . 1p. $f^{-1}(x) = \sqrt[3]{x+2}$; dom = range = (∞, ∞) . 1q. $f^{-1}(x) = \sqrt[3]{\frac{1-8x}{x}}$; dom = $(-\infty, 0) \cup (0, \infty)$, range = $(-\infty, -2) \cup (-2, \infty)$. 1r. $f^{-1}(x) = \sqrt[5]{\frac{x^3-2}{3}}$; dom = range = (∞, ∞) . 1s. $f^{-1}(x) = \frac{1}{2-7x^5}$; dom = $(-\infty, \sqrt[5]{2/7}) \cup (\sqrt[5]{2/7}, \infty)$, range = $(-\infty, 0) \cup (0, \infty)$. 1t. $f^{-1}(x) = 2 + (x-1)^{3/5}$; dom = range = (∞, ∞) . 1u. $f^{-1}(x) = (x+3)^{9/7} - 4$; dom = range = (∞, ∞) . 1v. $f^{-1}(x) = 3 - (x-4)^{-9/5}$; dom = $(-\infty, 4) \cup (4, \infty)$, range = $(-\infty, 3) \cup (3, \infty)$. 1w. $f^{-1}(x) = -4 - (x+5)^{-3/7}$; dom = $(-\infty, -5) \cup (-5, \infty)$, range = $(-\infty, 4) \cup (4, \infty)$. 1x. $f^{-1}(x) = (x-6)^{-5/9} - 8$; dom = $(-\infty, 6) \cup (6, \infty)$, range = $(-\infty, -8) \cup (-8, \infty)$. 2a. $f^{-1}(x) = x^2 + 5$; dom = $[0, \infty)$, range = $[5, \infty)$. 2b. $f^{-1}(x) = \frac{1}{9}x^2 - 7$; dom = $[0, \infty)$, range = $(-7, \infty)$. 2c. $f^{-1}(x) = 4x^{-2} - 3$; dom = $(0, \infty)$, range = $(-3, \infty)$. 2d. $f^{-1}(x) = \sqrt[3]{1-x^2}$; dom = $[0, \infty)$, range = $(-\infty, 1]$. 2e. $f^{-1}(x) = \frac{-2x^2+1}{x^2}$; dom = $(0, \infty)$, range = $(-2, \infty)$. 2f. $f^{-1}(x) = \frac{-2x^2+1}{x^2}$; dom = $(-\infty, 0)$, range = $(-2, \infty)$.