

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  $f^{-1}$ .

- |                                       |                               |                               |
|---------------------------------------|-------------------------------|-------------------------------|
| 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  $f^{-1}$ .

- |                          |                                  |                                   |
|--------------------------|----------------------------------|-----------------------------------|
| 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 =  $(\infty, \infty)$ . 1b.  $f^{-1}(x) = \frac{x-2}{3}$ ; dom = range =  $(\infty, \infty)$ . 1c.  $f^{-1}(x) = -x - 4$ ; dom = range =  $(\infty, \infty)$ . 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 =  $(\infty, \infty)$ . 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 =  $(\infty, \infty)$ . 1p.  $f^{-1}(x) = \sqrt[3]{x+2}$ ; dom = range =  $(\infty, \infty)$ . 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 =  $(\infty, \infty)$ . 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 =  $(\infty, \infty)$ . 1u.  $f^{-1}(x) = (x+3)^{9/7} - 4$ ; dom = range =  $(\infty, \infty)$ . 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.  $f^{-1}(x) = \frac{1}{3}x^2 - 7$ ; 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 =  $(-2, \infty)$ .