
RADICALS AND INVERSE FUNCTIONS

1. Simplify:

a. $\sqrt{x} \sqrt[4]{x}$

b. $\sqrt[5]{x} \sqrt[7]{x}$

c. $\sqrt[4]{n} \sqrt[3]{n} \sqrt{n}$

d. $\sqrt{\sqrt{\sqrt{y}}}$

e. $\sqrt{\sqrt[3]{\sqrt[4]{\sqrt[5]{w}}}}$

f. $(\sqrt{a} \sqrt[3]{a})^6$

g. $\sqrt[12]{a^9}$

h. $\frac{1}{\sqrt[6]{x^2}}$

i. $\frac{x}{\sqrt[10]{x^9}}$

j. $\sqrt[88]{x^{77}}$

k. $\frac{2}{99\sqrt[3]{3}}$

l. $\frac{a + \sqrt{b}}{a - \sqrt{b}}$

2. Let $f(x) = x^2$ and $g(x) = 4x + 7$. Calculate:

a. $f(g(1))$

b. $g(f(1))$

c. $f(g(x))$

d. $g(f(x))$

e. $f(f(x))$

f. $g(g(x))$

3. Let $L(x) = \log x$ and $E(x) = 10^x$. Calculate:

a. $L(10)$

b. $E(3)$

c. $L(E(5))$

d. $E(L(10,000))$

e. $L(E(x))$

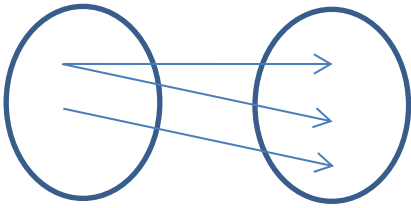
f. $E(L(x))$

g. $E(E(1))$

h. $L(L(10))$

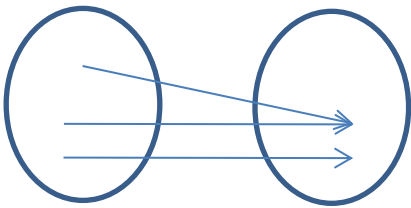
i. $L(0)$

4.



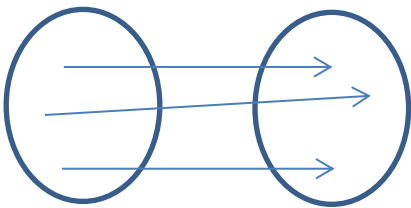
- a. Is the mapping a function?
- b. Change it a little bit to make it a function.

5.



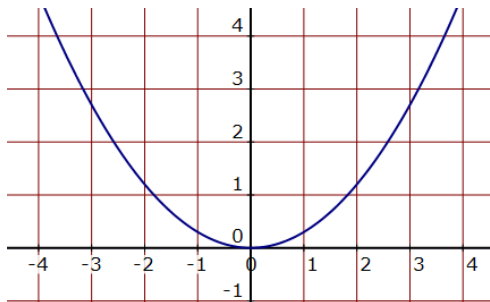
- a. Is the mapping a function?
- b. Is the inverse a function? Why or why not?

6.



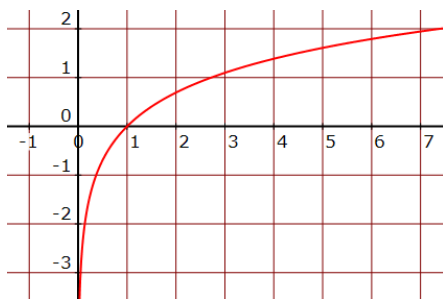
- a. Is the mapping a function?
- b. Is the inverse a function? Why or why not?

7.



- a. Is the graph a function?
- b. Is the graph a 1-1 function?
- c. What can you conclude about its inverse?
- d. Now “restrict the domain” to $[0, \infty)$; that is, require x to be ≥ 0 .
 - i) Sketch the graph of this restricted function.
 - ii) Is the graph of the restricted function 1-1?
 - iii) What can you deduce about the inverse of the restricted function?

8.



- a. Is the graph a function?
- b. Is the graph a 1-1 function?
- c. What can you conclude about its inverse?

9. Let $R = \{ (1, 2), (3, 7), (5, 7) \}$

- a. Is R a function?
- b. Is R a 1-1 function?
- c. What is R^{-1} ?
- d. Is R^{-1} a function?

10. Let $t = \{ (1, 2), (3, 7), (5, \pi) \}$

- a. Is t a function?
- b. Is t a 1-1 function?
- c. What is t^{-1} ?
- d. Is t^{-1} a function?

11. a. A function is 1-1. What conclusion can you draw about its inverse?
b. A function is NOT 1-1. What conclusion can you draw about its inverse?

12. a. If $g(x) = 7x + 2$, then $g^{-1}(x) =$

b. If $h(x) = \frac{1}{x}$, then $h^{-1}(x) =$

c. If $K(x) = \frac{2}{x+3}$, then $K^{-1}(x) =$

d. If $f(x) = e^x$, then $f^{-1}(x) =$

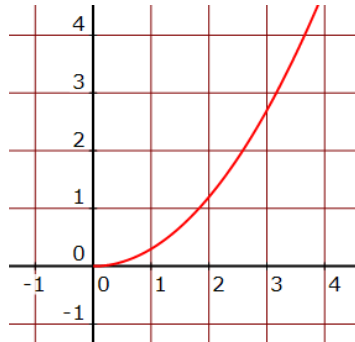
e. If $g(x) = \ln x$, then $g^{-1}(x) =$

Solutions

1. a. $\sqrt[4]{x^3}$ b. $\sqrt[35]{x^{12}}$ c. $\sqrt[12]{n^{13}}$, or $n\sqrt[12]{n}$
- d. $\sqrt[8]{y}$ e. $\sqrt[120]{w}$ f. a^5
- g. $\sqrt[4]{a^3}$ h. $\frac{\sqrt[6]{x^4}}{x}$, or $\frac{\sqrt[3]{x^2}}{x}$ i. $\sqrt[10]{x}$
- j. $\sqrt[8]{x^7}$ k. $\frac{2^{99}\sqrt[99]{3^{98}}}{3}$ l. $\frac{a^2 + 2a\sqrt{b} + b}{a^2 - b}$
2. a. 121 b. 11 c. $16x^2 + 56x + 49$
- d. $4x^2 + 7$ e. x^4 f. $16x + 35$
3. a. 1 b. 1,000 c. 5
- d. 10,000 e. x f. x
- g. 10,000,000,000 h. 0 i. Undefined
4. a. No b. Remove one of the top two arrows.
5. a. Yes b. No; it's not 1-1.
6. a. Yes b. Yes; it's 1-1.

7. a. Yes b. No c. The inverse is not a function.

d. i)



ii) Yes

iii) The inverse is a function.

8. a. Yes b. Yes c. The inverse is a function.

9. a. Yes b. No c. $\{(2, 1), (7, 3), (7, 5)\}$ d. No

10. a. Yes b. Yes c. $\{(2, 1), (7, 3), (\pi, 5)\}$ d. Yes

11. a. It's a function b. It's not a function.

12. a. $\frac{x-2}{7}$ b. $\frac{1}{x}$ c. $\frac{2-3x}{x}$

- d. $\ln x$ e. e^x