

8.1 Radical Functions

Given the function $f(x) = 3.2\sqrt[6]{x}$ find the following:

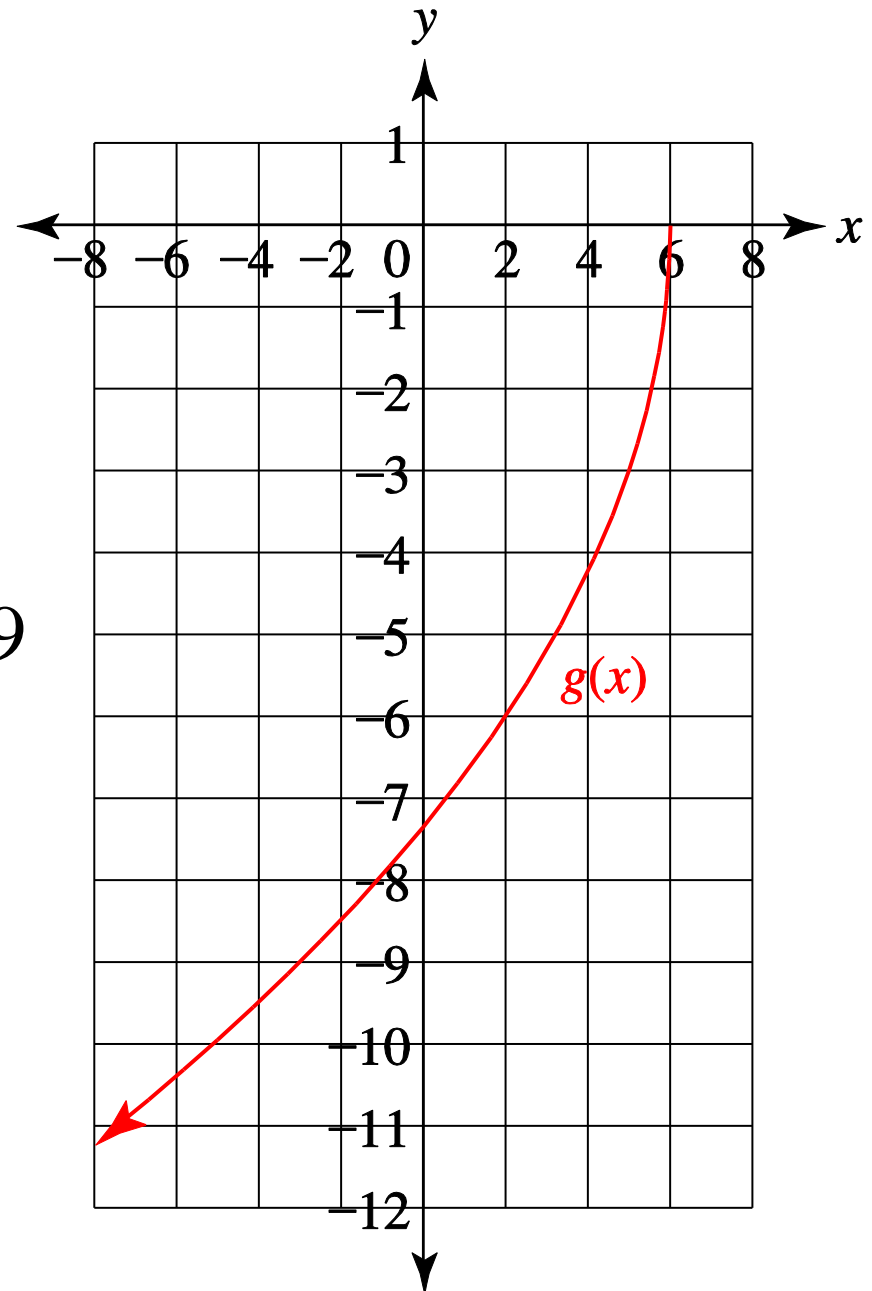
a. $f(45)$

b. Estimate x such that $f(x) = 16$

Given the graph of the function find the following:

a. Estimate $g(2)$

b. Estimate x such that $g(x) = -9$



Give the domain and range of the following radical functions.

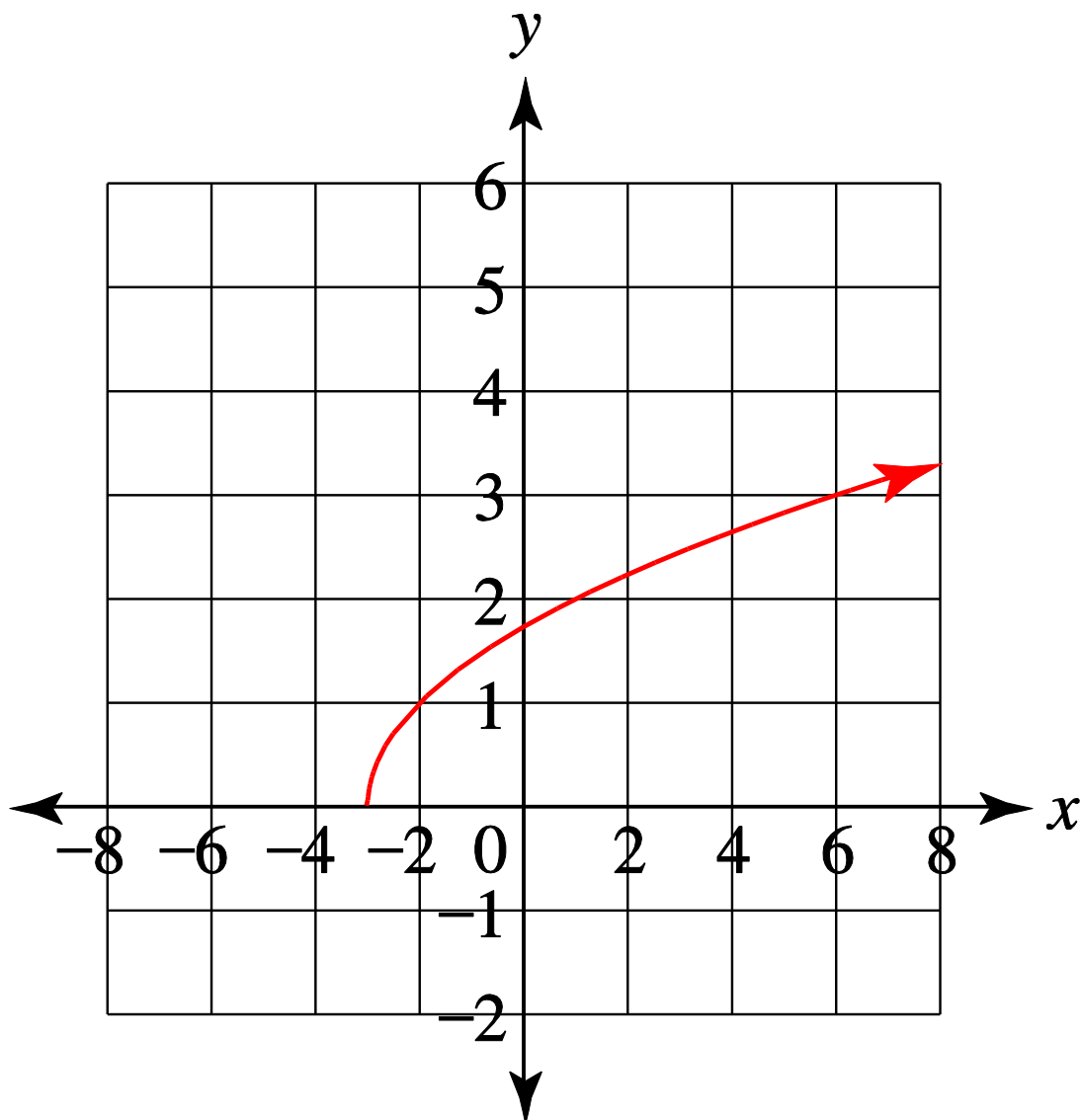
a. $h(x) = \sqrt{x+10}$

b. $g(x) = \sqrt[7]{x+5}$

c. $f(x) = \sqrt{8-x}$

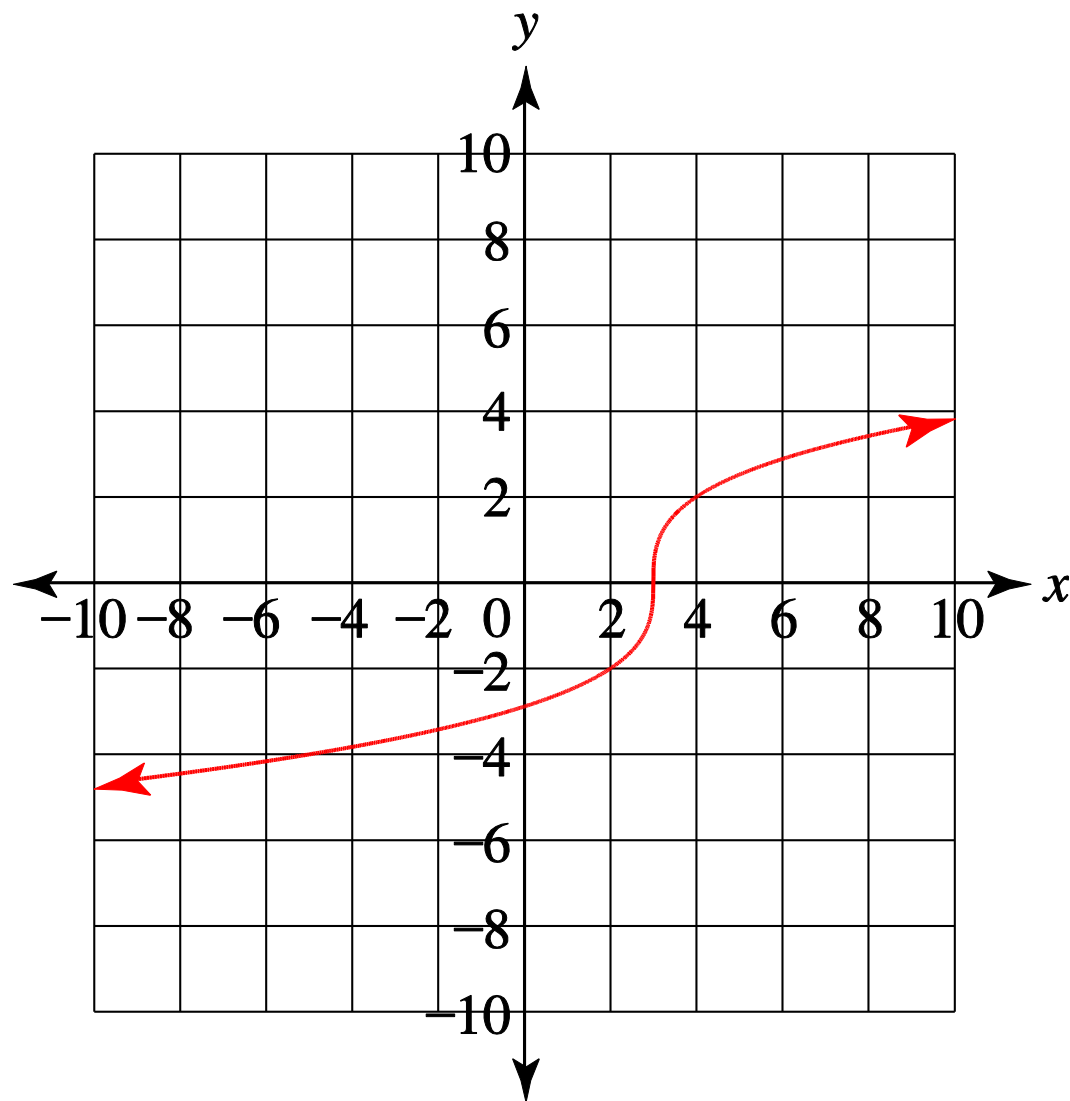
Give the domain and range of the following radical functions.

a.



Give the domain and range of the following radical functions.

b.



3.1 Exponents revisited

Radical expression can also be written with rational (fraction) exponents.

In general: $a^{1/n} = \sqrt[n]{a}$

Examples:

a. $x^{1/2} =$ _____

b. $\sqrt[3]{t} =$ _____

Similarly: $a^{m/n} = \sqrt[n]{a^m}$ OR $\sqrt[n]{a^m}$

Examples:

a. $d^{3/5} =$ _____

b. $\sqrt[4]{w^3} =$ _____

Rewrite the following exponents in radical form.

a. $a^{\frac{1}{4}}$

b. $p^{\frac{3}{5}}$

Rewrite the following radicals using rational exponents.

c. $\sqrt{6x}$

d. $\sqrt[7]{h^2}$

Simplify the following expressions. Write all answers without negative exponents.

a. $\left(81m^2n^8\right)^{\frac{1}{2}}$

b. $\left(\frac{32x^5y^{10}z^{-1}}{2xy^{-2}z^3}\right)^{\frac{1}{4}}$

8.2 Simplifying, Adding, and Subtracting Radicals

Evaluate the following radicals without a calculator.

a. $\sqrt{4}$

b. $\sqrt[3]{343}$

c. $\sqrt[3]{-64}$

d. $\sqrt[5]{32}$

Simplify the following radicals. Assume all variables are nonnegative.

a. $\sqrt{36m^2}$

b. $\sqrt[3]{54g^4h^{11}}$

Add or subtract the following expressions. Assume all variables are nonnegative.

a. $5\sqrt{6} + 4\sqrt{6}$

b. $7ab^2\sqrt{7ab} + 4a\sqrt{63ab^5}$

Add or subtract the following expressions. Assume all variables are nonnegative.

a. $8\sqrt{3a} + 4\sqrt[5]{3a} - 2\sqrt{3a} + 17\sqrt[5]{3a}$

b. $\sqrt[4]{32m^5n^6} + 3\sqrt[5]{2mn^2} - 5mn\sqrt[4]{2mn^2}$

8.3 Multiply and Divide Radicals

a. $\sqrt{3a} \cdot \sqrt{5b}$

b. $\sqrt{6m} \cdot \sqrt{10m}$

c. $\sqrt[3]{6a} \cdot \sqrt[3]{12a^2}$

Multiply the following and simplify the result.

a. $(2 + \sqrt{11})(8 - \sqrt{5})$

b. $(3 - \sqrt{5})^2$

Simplify the following radicals.

a. $\sqrt{\frac{16}{25}}$

b. $\sqrt{\frac{50a^5b^3}{8ab^7}}$

Rationalize the denominator and simplify the following radical expressions.

a. $\sqrt{\frac{7}{6}}$

b. $\sqrt{\frac{3a}{5b}}$

Rationalize the denominator of the following fractions.

a.
$$\frac{6}{5 + \sqrt{2}}$$

b.
$$\frac{4 + 7\sqrt{2}}{5 + \sqrt{6}}$$