

Part 1

Roots

ROOT1.tex

Exercise 1 How many solutions are there to $5 = x^2$?

Exercise 1.1 What are the solutions (from smaller to larger)?

$x =$ and $x =$

Exercise 2 How many solutions are there to $-243 = x^3$?

Exercise 2.1 What is the solution? (Enter your root as an exponent. Recall that $\sqrt[n]{x} = x^{\frac{1}{n}}$.)

$x =$

Exercise 3 How many solutions are there to $1 = x^{14}$?

Exercise 3.1 What are the solutions (from smaller to larger)?

$x =$ and $x =$

Exercise 4 How many solutions are there to $0 = x^{32}$?

Exercise 4.1 What is the solution?

$x =$

ROOT2.tex

Exercise 5 How many solutions are there to $5 + \sqrt{2 + x} = -4$?

Exercise 6 How many solutions are there to $2x^5 - 1 = 0$?

Exercise 6.1 What is the solution?

$x =$

Exercise 7 How many solutions are there to $3x^4 + 4 = 7$?

Exercise 7.1 What are the solutions (from smaller to larger)?

$x =$ and $x =$

ROOT3.tex

Exercise 8 Select all invertible functions below.

Select All Correct Answers:

- (a) $f(x) = x^3$ ✓
 - (b) $f(x) = x^3 - 9$ ✓
 - (c) $f(x) = 5x^5$ ✓
 - (d) $f(x) = x^2 - 2$
 - (e) $f(x) = x^4$
 - (f) $f(x) = 2x^6$
 - (g) $f(x) = 3x^7 - 7$ ✓
 - (h) $f(x) = x^{24} - 9$
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ROOT4.tex

Exercise 9 How many solutions are there to $x^3 = 0$?

Exercise 9.1 What is the solution?

$$x = \boxed{0}$$

Exercise 10 How many solutions are there to $x^3 - 9 = 0$? $\boxed{1}$

Exercise 10.1 What is the solution?

$$x = \boxed{\sqrt[3]{9}}$$

Exercise 11 How many solutions are there to $5x^5 = 1$? $\boxed{1}$

Exercise 11.1 What is the solution?

$$x = \boxed{\sqrt[5]{\frac{1}{5}}}$$

Exercise 12 How many solutions are there to $x^2 - 2 = 0$? $\boxed{2}$

Exercise 12.1 What are the solutions (from smaller to larger)?

$$x = \boxed{-\sqrt{2}} \text{ and } x = \boxed{\sqrt{2}}$$

Exercise 13 How many solutions are there to $x^4 = 0$? $\boxed{1}$

Exercise 13.1 What is the solution?

$$x = \boxed{0}$$

Exercise 14 How many solutions are there to $2x^6 = 1$?

Exercise 14.1 What are the solutions (from smaller to larger)?

$$x = \sqrt[6]{-\frac{1}{2}} \text{ and } x = \sqrt[6]{\frac{1}{2}}$$

Exercise 15 How many solutions are there to $3x^7 - 7 = 0$?

Exercise 15.1 What is the solution?

$$x = \sqrt[7]{\frac{7}{3}}$$

Exercise 16 How many solutions are there to $x^{24} - 9 = -10$?

ROOT5.tex

Exercise 17 Consider the function f defined by $f(x) = \sqrt{x+2}$.

- (a) What is the x -intercept of $f(x)$?
- (b) What is the y -intercept of $f(x)$?
- (c) What is the domain of $f(x)$?
- (d) What is the range of $f(x)$?
- (e) As $x \rightarrow \infty$, $y \rightarrow$.

Exercise 18 Consider the function g defined by $g(x) = x^2 - 2$.

- (a) What are the x -intercepts of $g(x)$ (from left to right)?

- (b) What is the y -intercept of $g(x)$? $(\boxed{0}, \boxed{-2})$
- (c) What is the domain of $g(x)$? $(\boxed{-\infty}, \boxed{\infty})$
- (d) What is the range of $g(x)$? $(\boxed{-2}, \boxed{\infty})$
- (e) As $x \rightarrow \infty$, $y \rightarrow \boxed{\infty}$.

ROOT6.tex

Exercise 19 How many solutions are there to $x^3 = -1$? $\boxed{1}$

Exercise 19.1 What is the solution?

$$x = \boxed{\sqrt[3]{-1}}$$

Exercise 20 How many solutions are there to $x^2 = -1$? $\boxed{0}$

Exercise 21 How many solutions are there to $\frac{1}{5}x^4 + 2 = 7$? $\boxed{2}$

Exercise 21.1 What are the solutions (from smaller to larger)?

$$x = \boxed{-\sqrt[4]{25}} \text{ and } x = \boxed{\sqrt[4]{25}}$$

Exercise 22 How many solutions are there to $x^{22} = 0$? $\boxed{1}$

Exercise 22.1 What is the solution?

$$x = \boxed{0}$$

Exercise 23 How many solutions are there to $x^4 - 16 = 0$? $\boxed{2}$

Exercise 23.1 What are the solutions (from smaller to larger)?

$$x = \boxed{-2} \text{ and } x = \boxed{2}$$

Exercise 24 How many solutions are there to $7x^8 = 5$? $\boxed{2}$

Exercise 24.1 What are the solutions (from smaller to larger)?

$$x = \boxed{-\sqrt[8]{\frac{5}{7}}} \text{ and } x = \boxed{\sqrt[8]{\frac{5}{7}}}$$

Exercise 25 How many solutions are there to $44x^{19} + 14 = 28$? $\boxed{1}$

Exercise 25.1 What is the solution?

$$x = \boxed{\sqrt[19]{\frac{14}{44}}}$$

Exercise 26 How many solutions are there to $x^{23} - 9 = -10$? $\boxed{1}$

Exercise 26.1 What is the solution?

$$x = \boxed{\sqrt[23]{-1}}$$

ROOT7.tex

Exercise 27 Consider the function f defined by $f(x) = \sqrt[3]{x}$.

(a) What is the x -intercept of $f(x)$? $(\boxed{0}, \boxed{0})$

(b) What is the y -intercept of $f(x)$? $(\boxed{0}, \boxed{0})$

- (c) What is the domain of $f(x)$? $\boxed{[-\infty, \infty)}$
 - (d) What is the range of $f(x)$? $\boxed{[-\infty, \infty)}$
 - (e) As $x \rightarrow \infty$, $y \rightarrow \boxed{\infty}$.
 - (f) As $x \rightarrow -\infty$, $y \rightarrow \boxed{-\infty}$.
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Exercise 28 Consider the function g defined by $g(x) = -\sqrt[3]{x}$.

- (a) What is the x -intercept of $g(x)$? $\boxed{0}, \boxed{0}$.
 - (b) What is the y -intercept of $g(x)$? $\boxed{0}, \boxed{0}$
 - (c) What is the domain of $g(x)$? $\boxed{(-\infty, \infty)}$
 - (d) What is the range of $g(x)$? $\boxed{[-\infty, \infty)}$
 - (e) As $x \rightarrow \infty$, $y \rightarrow \boxed{-\infty}$.
 - (f) As $x \rightarrow -\infty$, $y \rightarrow \boxed{\infty}$.
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Exercise 29 Consider the function g defined by $g(x) = \sqrt[3]{-x}$.

- (a) What is the x -intercept of $g(x)$? $\boxed{0}, \boxed{0}$.
 - (b) What is the y -intercept of $g(x)$? $\boxed{0}, \boxed{0}$
 - (c) What is the domain of $g(x)$? $\boxed{(-\infty, \infty)}$
 - (d) What is the range of $g(x)$? $\boxed{[-\infty, \infty)}$
 - (e) As $x \rightarrow \infty$, $y \rightarrow \boxed{-\infty}$.
 - (f) As $x \rightarrow -\infty$, $y \rightarrow \boxed{\infty}$.
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ROOT8.tex

Exercise 30 Use completing the square to find the x-intercepts of the following function.

$$f(x) = x^2 - 6x - 7$$

Fill in the missing blanks below.

$$x^2 - 6x - 7 = (x - \boxed{3})^2 + \boxed{-16}$$

$$(x - \boxed{3})^2 - (\boxed{4})^2 = 0$$

$$(x + \boxed{1})(x - \boxed{7}) = 0$$

$$\text{Smaller } x \text{ intercept } (\boxed{-1}, 0)$$

$$\text{Larger } x \text{ intercept } (\boxed{7}, 0)$$

ROOT9.tex

Exercise 31 Use completing the square to find the x-intercepts of the following function.

$$f(x) = x^2 + 14x + 38$$

Fill in the missing blanks below.

$$x^2 + 14x + 38 = (x + \boxed{7})^2 + \boxed{-11}$$

$$(x + \boxed{7})^2 - (\boxed{\sqrt{11}})^2 = 0$$

$$(x + \boxed{7 - \sqrt{11}})(x + \boxed{7 + \sqrt{11}}) = 0 \text{ (Input the smaller value first).}$$

$$\text{Smaller } x \text{ intercept } (\boxed{-(7 + \sqrt{11})}, 0)$$

$$\text{Larger } x \text{ intercept } (\boxed{-(7 - \sqrt{11})}, 0)$$

ROOT10.tex

Exercise 32 Use completing the square to find the x-intercepts of the following function.

$$f(x) = x^2 + 5x - 30$$

Fill in the missing blanks below.

$$x^2 + 5x - 30 = \left(x + \boxed{\frac{5}{2}}\right)^2 + \boxed{-\frac{145}{4}}$$

$$\left(x + \boxed{\frac{5}{2}}\right)^2 - \left(\boxed{\sqrt{\frac{145}{4}}}\right)^2 = 0$$

$$\left(x + \frac{5 - \sqrt{145}}{2}\right) \left(x + \frac{5 + \sqrt{145}}{2}\right) = 0 \text{ (Input the smaller value first).}$$

$$\text{Smaller } x \text{ intercept } \left(-\left(\frac{5 + \sqrt{145}}{2}\right), 0\right)$$

$$\text{Larger } x \text{ intercept } \left(-\left(\frac{5 - \sqrt{145}}{2}\right), 0\right)$$
