

Problem 1

- a) $4x^4y(12xy^6 + 3y^5 + 4)$
- b) $3(3y+5)(3y-5)$
- c) $(3y+5)(2y-3)$
- d) $(y-3)(2y^2+5)$
- e) $-8mn(2mn^2-3n+1)$
- f) $(x+16)(x-3)$
- g) $(2y+5)^2$
- h) $(3t-5)(9t^2+15t+25)$
- i) $2m(m+3)(m+4)$
- j) $(x+4)(3x+1)$

Problem 2

- a) undefined when $x = 3$
- b) defined for all real numbers
- c) undefined when $x = 0$
- d) undefined when $x = -3$ or $x = -2$

Problem 3

- a) $\frac{12m^3}{5}$
- b) $\frac{3}{x-4}$
- c) $\frac{y}{2y+1}$
- d) $-\frac{1}{2(m+3)}$

Problem 4

- a) 3
- b) $\frac{a-2}{a-4}$
- c) $\frac{-3x+15}{4(x+3)(x+4)}$

- d) $\frac{2x^2+5x-5}{(x+1)^2(x+3)}$
- e) $\frac{3}{5(x-2)}$
- f) $-\frac{3y-1}{3}$

Problem 5

- a) $t = 4$
- b) $p = -3$
- c) no solution
- d) $n = -1$ or $n = 4$

Problem 6

- a) The relation is a function.
Domain: $\{0, 2, 4, 5, 9\}$
Range: $\{-9, -6, 7, 10\}$
- b) The relation is not a function.
Domain: $\{-6, 0, 1\}$
Range: $\{-7, 1, 3, 9\}$

Problem 7

- a) 0
- b) $2x^2+13x+20$
- c) $2x^2+9x+10$
- d) $4x^3+32x^2+85x+75$
- e) $x+3$
- f) -2
- g) -36
- h) -42
- i) 3

Problem 8

- a) The relation is not a function.
- b) The relation is a function.
- c) The relation is a function.
- d) The relation is not a function.

Problem 9

- a) $(-\infty, -6)$ or $(-6, -4)$ or $(-4, \infty)$
- b) $\left[\frac{3}{5}, \infty\right)$
- c) $(-\infty, \infty)$
- d) $(-\infty, \infty)$
- e) $(0, \infty)$

Problem 10

- a) 9
- b) 4
- c) 9
- d) -9

Problem 11

- a) Domain: $\{-6, -3, 4, 9\}$
Range: $\{5\}$
- b) Domain: $[-7, 3)$
Range: $[-5, 8)$

Problem 12

- a) 64
- b) $\sqrt[3]{4ab}$
- c) $\frac{1}{8}$
- d) $x^2\sqrt{7x}$

Problem 13

- a) $8m^8n^{11}$
- b) $4x^8y^4z\sqrt{3xz}$
- c) $3a^4b^5\sqrt[3]{4a^2bc}$
- d) $2m^3n^4\sqrt[3]{3n^2}$

Problem 14

- a) $\sqrt[6]{x^5}$
- b) $\sqrt[15]{n^2}$

Problem 15

- a) $-4\sqrt[3]{5}$
- b) $-2x\sqrt{5} + 8y^3\sqrt{7}$
- c) $-\sqrt{5y}$
- d) $30\sqrt[3]{2}$

Problem 16

- a) $3\sqrt{5} - \sqrt{35}$
- b) $\sqrt{14} + 21\sqrt{2}$
- c) $36y + 24y\sqrt{5}$
- d) $42 - 14\sqrt{5} + 6\sqrt{3} - 2\sqrt{15}$
- e) $2a + 3\sqrt{ab} + b$
- f) $3 - 2\sqrt{2}$
- g) $x^2 + 2x\sqrt{3} + 3$

Problem 17

- a) 5
- b) $3a^2b^6\sqrt{a}$
- c) $\frac{\sqrt[4]{9m^3}}{2n^3}$

Problem 18

- a) $\frac{9\sqrt{5x}}{5x}$
- b) $\frac{\sqrt{10}}{5}$
- c) $\frac{3\sqrt{2}}{2}$
- d) $\frac{\sqrt{2} + \sqrt{14}}{2}$

Problem 19

- a) $x = 6$
- b) $y = -6$
- c) $x = 2$
- d) $x = 7$

Problem 20

- a) $6i$
- b) $-7i$
- c) $4i\sqrt{5}$
- d) $12i\sqrt{5}$

Problem 21

- a) $3+4i$
- b) $4+i$
- c) $-14+7i$
- d) $13-18i$
- e) $-\frac{7}{6}i$
- f) $\frac{12}{5}-\frac{6}{5}i$
- g) $-\frac{1}{5}+\frac{2}{5}i$

Problem 22

- a) $x = -8$ or $x = 7$
- b) $m = \pm\frac{5}{3}$
- c) $n = -5$ or $n = -\frac{2}{3}$
- d) $y = -1$ or $y = 4$

Problem 23

- a) $r = \pm 4$
- b) $y = \pm 2i\sqrt{6}$
- c) $x = -\frac{1}{3}$ or $x = \frac{11}{3}$
- d) $n = \frac{-5 \pm 5\sqrt{3}}{2}$

Problem 24

- a) $x = -2$ or $x = -6$
- b) $n = -1$ or $n = 4$
- c) $x = 2 \pm 4\sqrt{2}$
- d) $x = 5 \pm 2i$

Problem 25

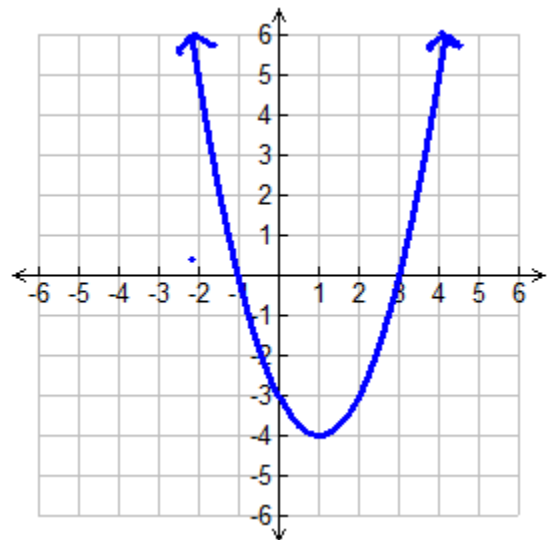
- a) $x = 3 \pm \sqrt{10}$
- b) $y = -4$ or $y = \frac{3}{2}$
- c) $x = \frac{5 \pm i\sqrt{3}}{4}$
- d) $x = \frac{-3 \pm \sqrt{17}}{2}$

Problem 26

- a) $n = \pm 2\sqrt{2}$
- b) $x = -1$ or $x = \frac{7}{4}$
- c) $n = \frac{-2 \pm 3\sqrt{2}}{3}$
- d) $p = 1 \pm i\sqrt{7}$

Problem 27

- a) Vertex: $(1, -4)$
Intercepts: $(-1, 0), (3, 0), (0, -3)$
Domain: $(-\infty, \infty)$
Range: $[-4, \infty)$

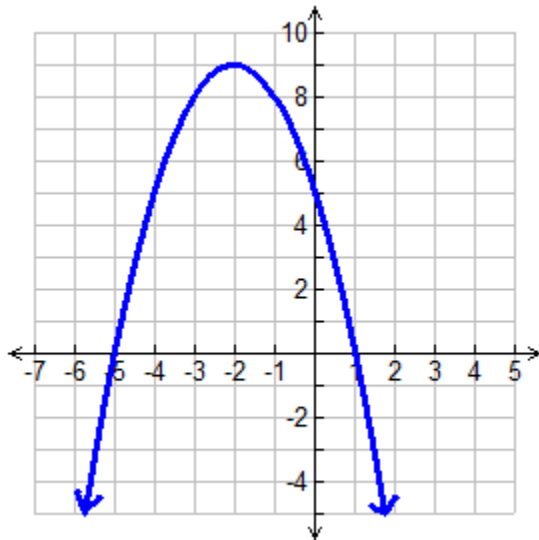


b) Vertex: $(-2, 9)$

Intercepts: $(-5, 0), (1, 0), (0, 5)$

Domain: $(-\infty, \infty)$

Range: $(-\infty, 9]$



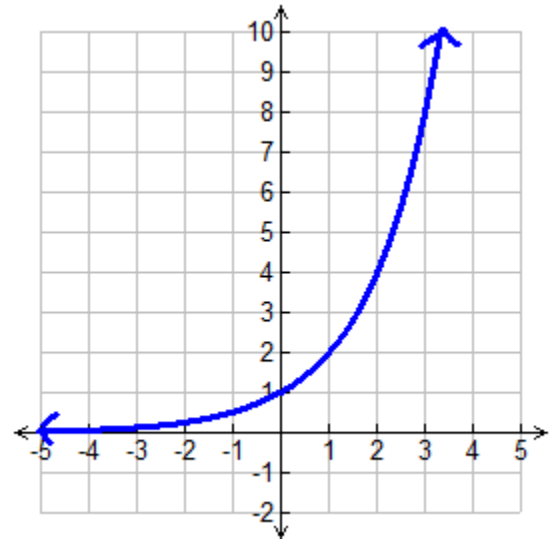
Problem 29

a) Selected Coordinates:

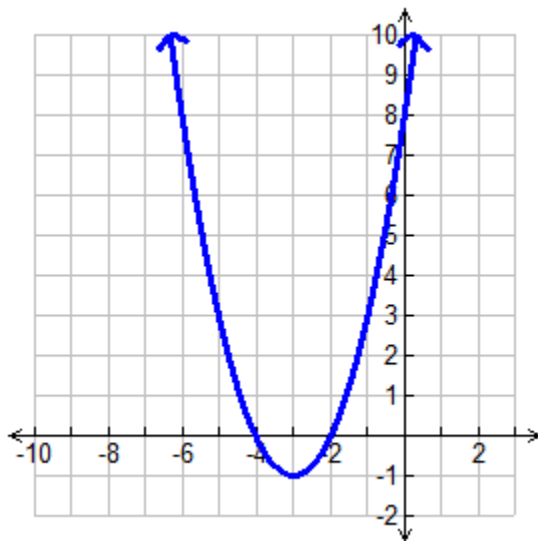
$(-2, \frac{1}{4}), (-1, \frac{1}{2}), (0, 1), (1, 2), (2, 4)$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$



Problem 28

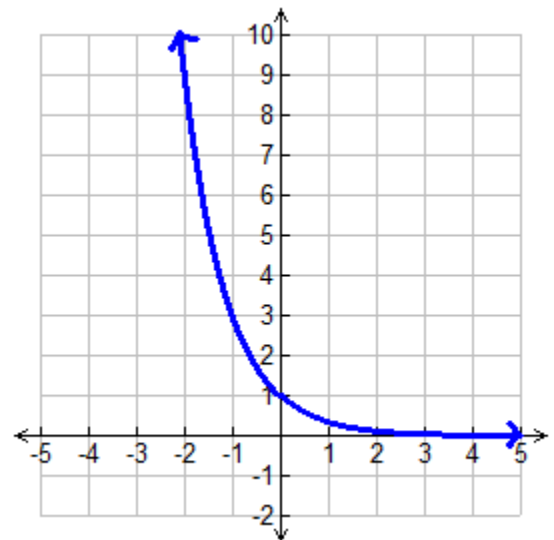


b) Selected Coordinates:

$(-2, 9), (-1, 3), (0, 1), (1, \frac{1}{3}), (2, \frac{1}{9})$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

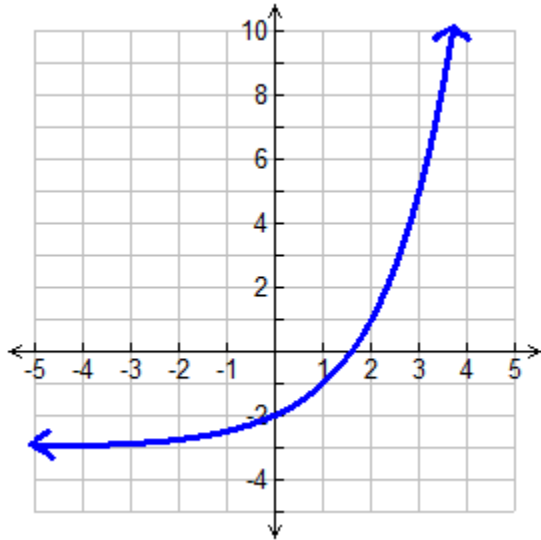


c) Selected Coordinates:

$$\left(-2, -\frac{11}{4}\right), \left(-1, -\frac{5}{2}\right), (0, -2), (1, -1), (2, 1)$$

Domain: $(-\infty, \infty)$

Range: $(-3, \infty)$

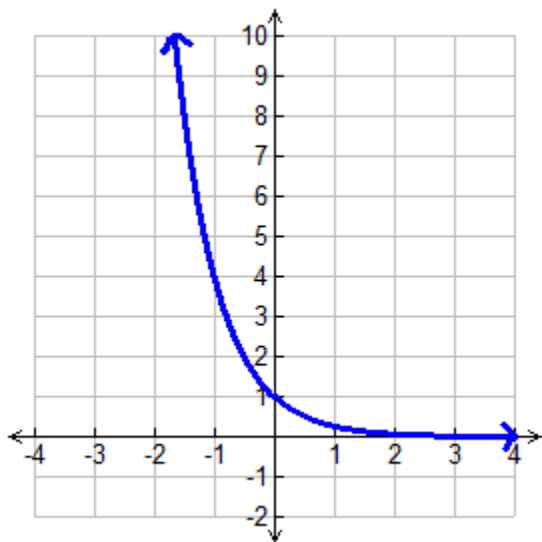


d) Selected Coordinates:

$$(-2, 16), (-1, 4), (0, 1), \left(1, \frac{1}{4}\right), \left(2, \frac{1}{16}\right)$$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

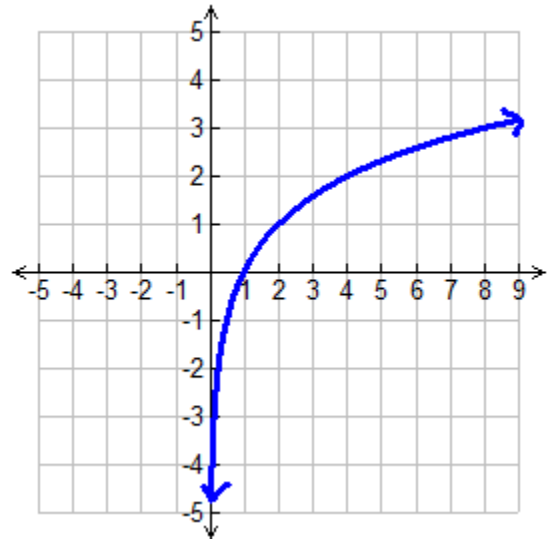


e) Selected Coordinates:

$$\left(\frac{1}{4}, -2\right), \left(\frac{1}{2}, -1\right), (1, 0), (2, 1), (4, 2)$$

Domain: $(0, \infty)$

Range: $(-\infty, \infty)$



Problem 30

- a) $2^4 = 16$
- b) $3^{-5} = \frac{1}{243}$
- c) $10^3 = 1000$
- d) $e^1 = e$

Problem 31

- a) $\log_6\left(\frac{1}{216}\right) = -3$
- b) $\log_7 30 = x$
- c) $\log_{1/4}\left(\frac{1}{16}\right) = 2$
- d) $\log_a 45 = 2$

Problem 32

- a) 3
- b) -1

Problem 33

- a) $x = 4$
- b) $x = \frac{3}{2}$
- c) $x = 0$
- d) $x = -12$
- e) $x = \frac{1}{4}$
- f) $x = 81$
- g) $m = 2$
- h) $n = 0$

Problem 34

The speed of the river's current was 4 miles per hour.

Problem 35

Paul and Sharese can complete the reports in 4 hours if working together.

Problem 36

The company's monthly revenue, when 4,000 tires are sold, is \$168,000.

Problem 37

The wavelength of a click that has a frequency of 500 hertz is 3.06 meters.

Problem 38

The stone reaches a maximum height of 316 feet after 1.5 seconds.

Problem 39

There are 320 rabbits in the barn after 6 weeks.