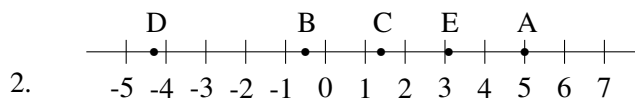


Chapter 2

Answers

2.1 Number and Operation

1. (a) $\mathbb{Z}, \mathbb{Q}, \mathbb{R}$ (f) \mathbb{R}
(b) \mathbb{Q}, \mathbb{R} (g) $\mathbb{Z}, \mathbb{Q}, \mathbb{R}$
(c) $\mathbb{Z}, \mathbb{Q}, \mathbb{R}$ (h) \mathbb{R}
(d) \mathbb{Q}, \mathbb{R} (i) $\mathbb{Z}, \mathbb{Q}, \mathbb{R}$
(e) \mathbb{Q}, \mathbb{R} (j) \mathbb{Q}, \mathbb{R}



3. (a) 4 (c) -5
(b) $\frac{9-5}{6} = \frac{4}{6} = \frac{2}{3}$ (d) -5
(e) 2
4. (a) $\frac{22}{15} = 1\frac{7}{15}$ (e) 3.375
(b) 452 (f) 1.5
(c) $\frac{7}{8}$ (g) -27
(d) $18\frac{13}{32}$ (h) 7
5. (a) 16 (e) $\frac{1}{3}$
(b) $\frac{1}{16}$ (f) -16
(c) 81 (g) 16
(d) 3
6. (a) 5 (c) 81
(b) 4 (d) $13.5 (= 13\frac{1}{2} = \frac{54}{4})$
- 7.

(a) 3

(c) 3

(b) 7

(d) 7

2.2 Polynomial expressions

2.2.1 Multiplying

1. $5x^2 - 12x + 4$

4. $3x^2 + 3x - 18$

2. $x^3 - 3x + 2$

5. $5x^3 - 12x^2 - 29x - 12$

3. $x^3 - 6x^2 - 4x - 8$

6. $45 - 108i$

2.2.2 Factoring

1. $(x + 16y)(x - 9y)$

4. $12x(x - 1)(3x + 4)$

2. $(2x - 5y)(5x + 3y)$

5. $(x + 3)(x + 1)(x - 1)$

3. $3xy^2(x + 5)(x - 5)$

6. $(x^2 + y^2)(x + y)(x - y)$

2.3 Rational expressions

1. $\frac{2x - 1}{x - 1}, x \neq -3$

4. $\frac{4}{x + 12}, x \neq 12$

2. $\frac{4x}{5}, x, y, \neq 0$

5. $\frac{(x + 3)}{2}, x \neq -1, 1, 3$

3. $\frac{3(x^2 + 3)}{(2x + 3)(x - 2)}$

6. $\frac{2}{x}, x \neq -5, -2, 1, 3$

2.3.1 Complex fractions

1. $\frac{2x}{x - 5}, x \neq -5, 0$

2. 9

3. $\frac{x}{x - 2}, x \neq -3, 5$

2.4 Radical expressions

1. $23\sqrt{3}$

5. $x^2y^7\sqrt[3]{x^2y}$

2. $7x^3y^2\sqrt{2}$

6. $2x^2y^3$

3. $5x^2\sqrt{3}$

7. $2\sqrt{4x^2 + 1}$

4. $32 + 12\sqrt{5}$

1. i

3. $\frac{5}{17} + \frac{14}{17}i$

2. $11 + 10i$

4. $4i\sqrt{2}$

2.5 Linear equations and inequalities

2.5.1 Equations

1. $\frac{1}{2}$

2. -1

3. $\frac{14}{3}$

4. $\frac{21}{5}$

5. $\frac{1}{2}$

6. $\frac{15}{8}$

7. $\frac{7}{2}$

2.5.2 Harder Equations

1. $\frac{69}{10}$

2. $\frac{92}{33}$

3. 10

4. all real numbers

5. no solution

6. $\frac{-20}{7}$

2.5.3 Inequalities

1. $x \in (-\infty, \frac{1}{2})$

2. $x \in [-1, \infty)$

3. $x \in (-\infty, \frac{21}{5})$

4. $x \in (-\infty, \frac{1}{2}]$

5. $x \in [\frac{7}{2}, \infty)$

6. $x \in (-4, 1]$

2.6 Systems of linear equations

1. $x = \frac{5}{2}, y = 4$

2. $x = 2, y = 4$

3. no solutions

4. infinitely many solutions, where $y = \frac{2}{3}x - \frac{5}{3}$

5. $x = 4, y = 3, z = -2$

6. $x = -3, y = -1, z = 4$

2.7 Absolute Value Equations and Inequalities – Answers

2.7.1 Equations

1. $x = \frac{8}{3}, \frac{-4}{3}$

2. $x = -3, 9$

3. No solutions.

4. $x = 0, 10$

5. $x = \frac{-1}{5}, 5$

2.7.2 Inequalities

1. $x \in (-2/3, 10/3)$

2. $x \in (-\infty, 1] \cup [7, \infty)$

3. $x \in \left[\frac{-4}{3}, \frac{8}{3} \right]$

4. $x \in (-\infty, \infty)$. Any real number is a solution.6. $x \in (-11, -5) \cup (7, 13)$

5. No solution.

2.8 Functions and graphs

2.8.1 Functions

1. Yes.

6. Yes.

2. No.

7. No.

3. Yes.

8. No.

4. Yes.

9. Yes.

5. Yes.

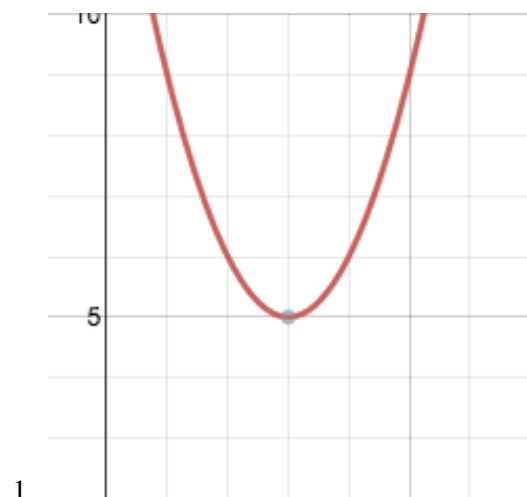
For the next problems,

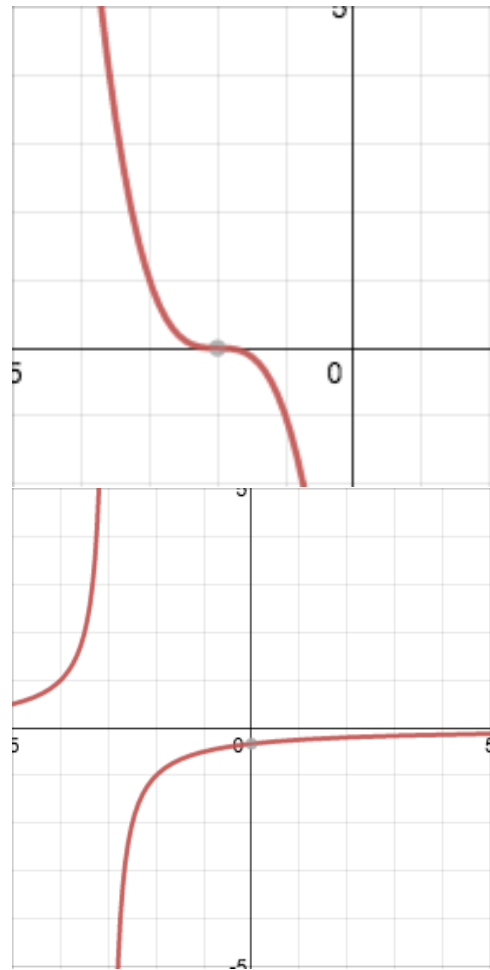
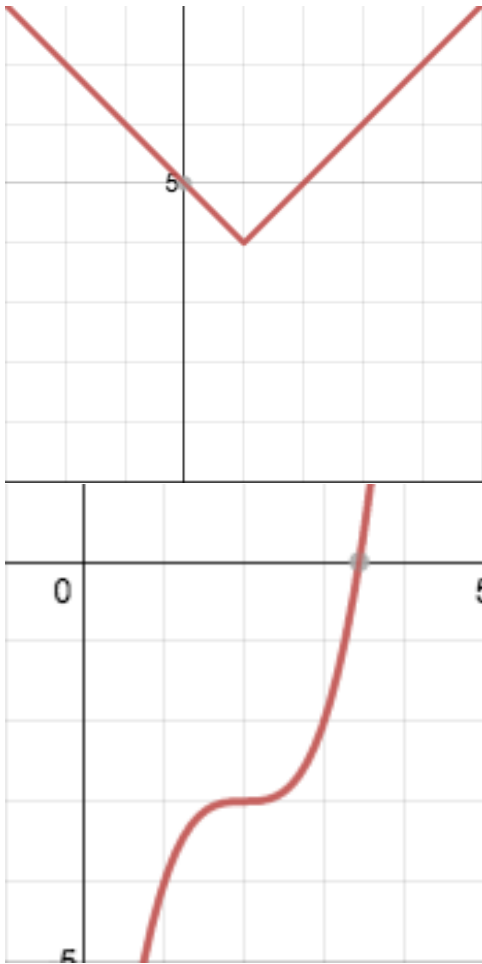
$$f(x) = \frac{1}{1-x}, g(x) = x^2 + 1$$

1. $x \neq 1$ 7. $\frac{1}{3}$

2. all real numbers

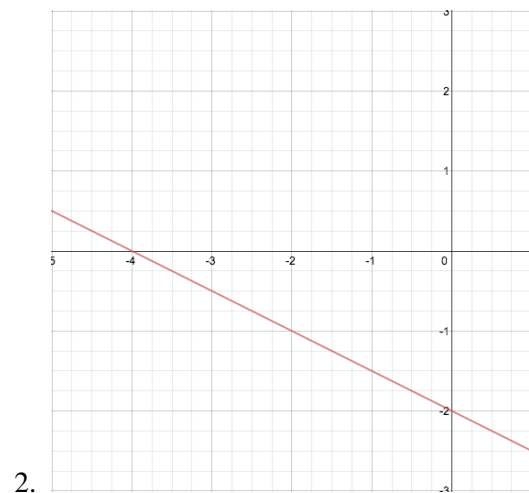
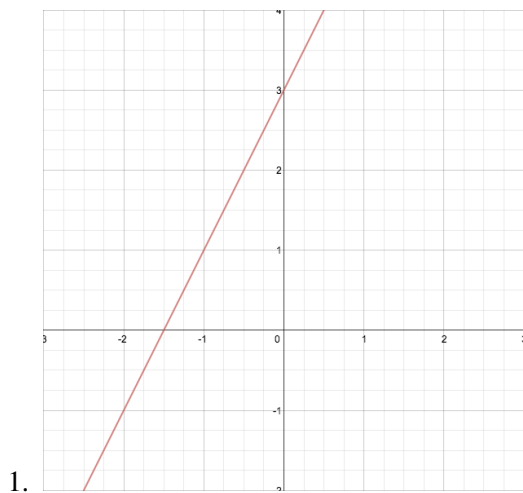
8. 5

3. $\frac{1}{1-x+x^2-x^3} = \frac{1}{(1-x)(x^2+1)}, x \neq 1$ 9. $\frac{x}{x-1}$ 4. $(x^2+1)(1-x), x \neq 1$ 10. $\frac{x-1}{x}$ 5. $-\frac{1}{x^2}, x \neq 0$ 11. For example, $g(1) = g(-1) = 2$, so there can be no inverse at 2.6. $\frac{1}{(1-x)^2}, x \neq 1$ 12. $\frac{5x+3}{2-x}$ 

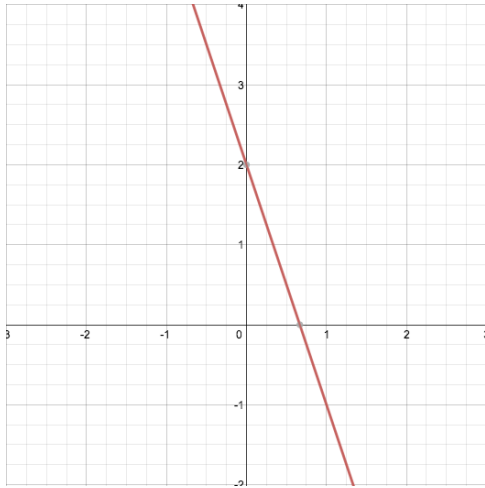


2.9 Graphs of linear equations and inequalities

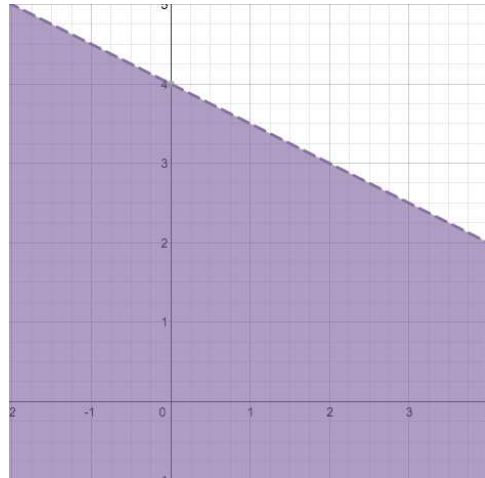
2.9.1 Drawing graphs



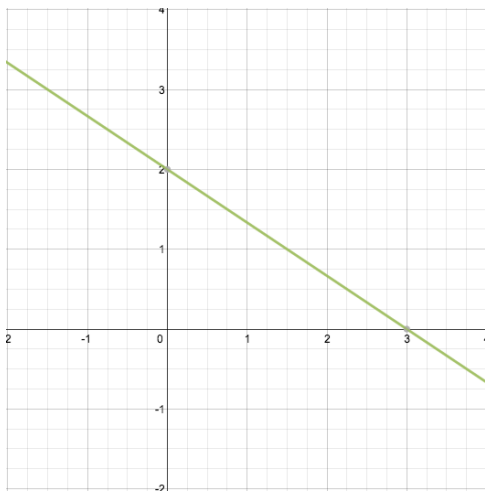
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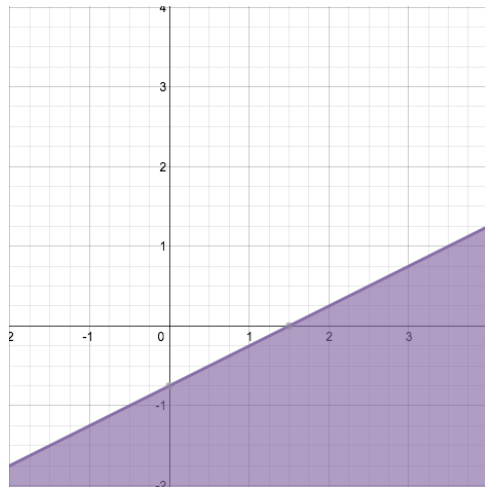
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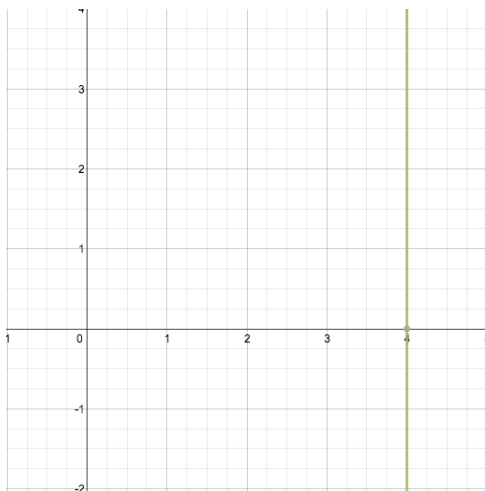
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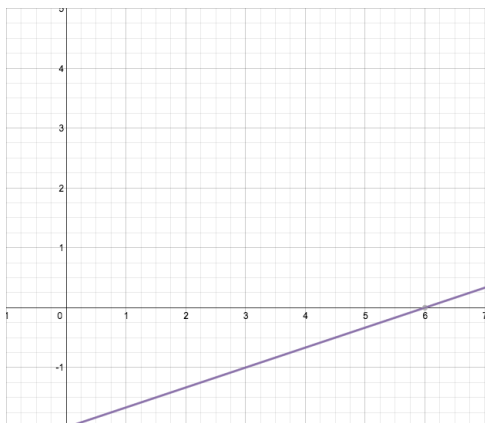
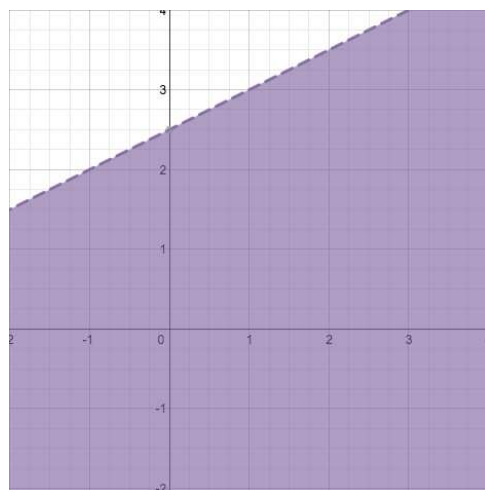
8.



5.



9.



2.9.2 Finding equations of lines

Find the equations of lines (in slope-intercept form)

1. $y = -2x - 1$

2. $y = -\frac{5}{3}x + \frac{1}{3}$

3. $x = 1$

4. $y = 2x + 3$

5. $y = \frac{1}{2}x + \frac{3}{2}$

6. $x = 2$

2.10 Polynomial equations

1. 1

2. 1,7

3. -1,6

4. 0,2

5. $\pm\frac{1}{2}$

6. no real solution

7. -4,2

8. $-\frac{1}{2}, 2$

9. $-\frac{1}{3}, \frac{3}{2}$

10. $\frac{1}{3}, \frac{3}{4}$

11. -1,1

12. 1,49

13. -1,0,6

14. -2,0,2

15. $2 \pm \sqrt{7}$

16. $1 \pm \sqrt{6}$

17. $\frac{-7 \pm \sqrt{37}}{2}$

18. no real solution

19. -7

20. 7

2.11 Graphs of quadratic functions

1. $2x^2 - 4x + 6$

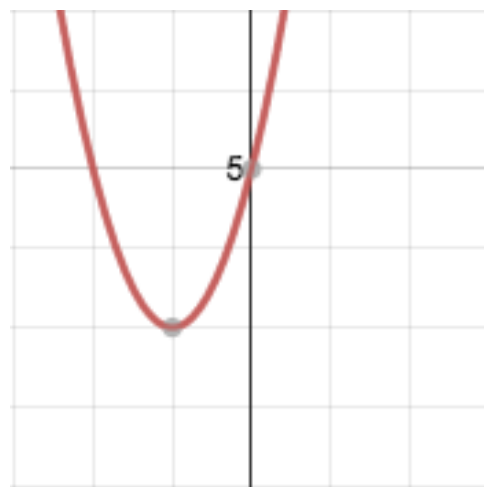
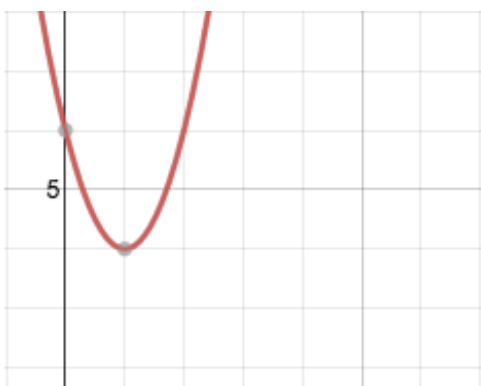
2. $2(x+1)^2 + 3$

3. (1,4)

4. (-1,3)

5. $y = -5(x+1) + 3$

6. $y = (x+2)(x-3) = x^2 - x - 6$. Any nonzero multiple of this is also OK.



8.

2.12 Equations involving radicals

1. -2

3. 5

2. 4

1. $\frac{9}{5}$

2. $\frac{3}{32}$

2.13 Exponential and Logarithmic functions

1. 4

6. $\frac{8}{27}$

2. $\frac{1}{4}$

7. -1

3. 4

8. 3

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

9. $\frac{1}{2}$

5. -4

1. 0.001

5. 3

2. $\frac{1}{\sqrt{2}}$

6. $\ln 7$

3. $\frac{1}{2} \ln 2 = \ln \sqrt{2}$

7. 2

4. 8

8. $\frac{5}{2}$

1. $\log_2 y \sqrt{x}$

2. $\log \frac{x^3}{y^2 z}$

1. $\log x + \frac{1}{2} \log y - \log z$

2. $1 + 2 \log_4 x + 3 \log_4 y$