

Review exercises 0 Algebra

Problems

R0.1 Evaluate each expression:

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|----|----------|----|-------------------------|----|---------------------------------|
| a) | 2^4 | b) | $(-2)^4$ | c) | -2^4 |
| d) | 3^{-4} | e) | $\frac{5^{23}}{5^{21}}$ | f) | $\left(\frac{2}{3}\right)^{-2}$ |

R0.2 Evaluate each expression:

- | | | | | | |
|----|----------------------------------|----|--------------------|----|----------------------------------|
| a) | $2^4 \cdot 2^3$ | b) | $2^4 \cdot 2^{-3}$ | c) | $2^4 \cdot (-2)^{-3}$ |
| d) | $(2^3)^2$ | e) | $(2^{-3})^2$ | f) | $(-2^{-3})^{-2}$ |
| g) | $((-2)^{-3})^{-2}$ | h) | $-(2^{-3})^{-2}$ | i) | $\left(-\frac{1}{5}\right)^{-2}$ |
| j) | $\left(-\frac{3}{4}\right)^{-3}$ | | | | |

R0.3 Decide whether each statement is true or false:

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|----|--------------------------|----|---|----|----------------------------|
| a) | $(p + q)^2 = p^2 + q^2$ | b) | $\sqrt{ab} = \sqrt{a} \sqrt{b}$ | c) | $\sqrt{a^2 + b^2} = a + b$ |
| d) | $\frac{1+ab}{b} = 1 + a$ | e) | $\frac{1}{x-y} = \frac{1}{x} - \frac{1}{y}$ | | |

R0.4 Simplify each expression:

- | | | | | | |
|----|---------------------------------|----|-----------------------|----|---------------------------------|
| a) | $a^3 \cdot a^2$ | b) | $5^{n-1} \cdot 5^4$ | c) | $7^{n+1} \cdot 7^{n-1}$ |
| d) | $a^{x+5} : (a^x \cdot a^5)$ | e) | $(2a^3 \cdot 3a^2)^2$ | f) | $(a^2b)^{25} \cdot (ab^4)^{25}$ |
| g) | $\frac{10a^{-3}}{5a^{-2}} 2a^3$ | | | | |

R0.5 Simplify the following expression:

- | | | | | | |
|----|---------------------------|----|---|----|---|
| a) | $x^5 \cdot x^{-7}$ | b) | $\frac{x^8}{x^{-2}}$ | c) | $(-y^{-3})^{-2}$ |
| d) | $(x - y)(x^2 + xy + y^2)$ | e) | $\frac{4x^2y^3 - 6x^3y^4}{2x^2y^2 - 3xy^3}$ | f) | $\frac{x-1 - \frac{x-1}{x}}{\frac{1}{x-1} + 1}$ |

R0.6 Simplify each fraction:

- | | | | | | |
|----|---------------------------|----|----------------------|----|-----------------------------|
| a) | $\frac{24a^2bc^2}{56abc}$ | b) | $\frac{uw}{uv + uw}$ | c) | $\frac{n^3 - n}{n^3 + n^2}$ |
|----|---------------------------|----|----------------------|----|-----------------------------|

R0.7 Simplify and rewrite the expression with a single fraction:

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|----|---------------------------------|----|---|----|---|
| a) | $\frac{1}{m+1} + \frac{m}{m+1}$ | b) | $\frac{2p}{15q} + \frac{8p}{9q}$ | c) | $\frac{1}{r^2} - \frac{1}{r^3}$ |
| d) | $d - \frac{nd-2}{n}$ | e) | $\frac{t+7}{3t-6} - \frac{t+4}{t^2-2t}$ | f) | $\frac{d-1}{18d} \cdot \frac{12d^2}{1-d}$ |

g) $\frac{\frac{u}{v}}{x}$

h) $\frac{\frac{x}{u}}{\frac{u}{v}}$

i) $\frac{2e - 6f}{\frac{3e^2 - 9ef}{2f}}$

j) $\frac{\frac{\frac{n}{n^2-1}}{1 - \frac{1}{n-1}}}{n+1 - \frac{1}{n-1}}$

k) $\frac{x^2}{x^2-4} - \frac{x+1}{x+2}$

R0.8 Harshbarger/Reynolds*: Chapter 0, Algebraic Concepts
(Scanned pages 2-55 and A1-A5 in file “Algebraic Concepts.pdf” on Moodle)

Exercises in sections

- 0.3 (p. 18-20)
- 0.5 (p. 34-36)
- 0.6 (p. 41-42)
- 0.7 (p. 48-49)
- Review Exercises (p. 51-54)
- Chapter Test (p. 54-55)

*Harshbarger, R.J. and Reynolds, J.J.: Mathematical Applications for the Management, Life, and Social Sciences; Houghton Mifflin Company, Boston / New York 2007, 8th edition, ISBN 978-0-618-73162-6

Answers

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|------|--|------------------|----|----------------------------|----|-----------------------|
| R0.1 | a) | 16 | b) | 16 | c) | - 16 |
| | d) | $\frac{1}{81}$ | e) | 25 | f) | $\frac{9}{4}$ |
| R0.2 | a) | 128 | b) | 2 | c) | -2 |
| | d) | 64 | e) | $\frac{1}{64}$ | f) | 64 |
| | g) | 64 | h) | -64 | i) | 25 |
| | j) | $-\frac{64}{27}$ | | | | |
| R0.3 | a) | false | b) | true | c) | false |
| | d) | false | e) | false | | |
| R0.4 | a) | a^5 | b) | 5^{n+3} | c) | 7^{2n} |
| | d) | 1 | e) | $36a^{10}$ | f) | $a^{75} b^{125}$ |
| | g) | $4a^2$ | | | | |
| R0.5 | a) | $\frac{1}{x^2}$ | b) | x^{10} | c) | y^6 |
| | d) | $x^3 - y^3$ | e) | $\frac{2xy(2-3xy)}{2x-3y}$ | f) | $\frac{(x-1)^3}{x^2}$ |
| R0.6 | a) | $\frac{3ac}{7}$ | b) | $\frac{w}{v+w}$ | c) | $\frac{n-1}{n}$ |
| R0.7 | a) | 1 | b) | $\frac{46p}{45q}$ | c) | $\frac{r-1}{r^3}$ |
| | d) | $\frac{2}{n}$ | e) | $\frac{t+6}{3t}$ | f) | $-\frac{2d}{3}$ |
| | g) | $\frac{u}{vx}$ | h) | $\frac{vx}{u}$ | i) | $\frac{4f}{3e}$ |
| | j) | $-\frac{n}{2}$ | k) | $\frac{1}{x-2}$ | | |
| R0.8 | see Harshbarger/Reynolds: Chapter 0, Algebraic Concepts
(Scanned pages 2-55 and A1-A5 in file "Algebraic Concepts.pdf" on Moodle) | | | | | |