

Section 1.1: Sets, Intervals, and Absolute Value

- Find the union and the intersection of $A = \{1, 3, 8, 9, 10, 101\}$ and $B = \{-1, 2, 3, 8, 101, 120\}$.
- In the set $\{-7, \frac{2}{5}, -0.7, \sqrt{7}, 0, \pi, -\sqrt{100}\}$, list all numbers that are A) integers, B) rational, and C) irrational.
- Rewrite the expression in an equivalent form without absolute value bars.
(a) $|\sqrt{3} - 5|$ (b) $|2x - 1|$
- What are the possible values of $\frac{|2x + 1|}{2x + 1}$?
- Using the absolute value symbol, express each statement:
(a) the distance between x and 1
(b) the distance between x and 1 is more than 5 units
- Interpret $|x| \leq 2$ as distance from the origin. Draw this set on a number line. Express this set using interval notation.
- Express the graphed set using interval notation.
- Represent the solution graph using absolute value.

Section 1.2: Exponents and Radicals

- Simplify. Write all answers using positive exponents only.
(a) -6^0 (b) $\frac{5^{-3}}{5}$ (c) $3(2x^{-2}y^3)^5$ (d) $\frac{36x^4y^9}{64x^{-5}y^{12}}$ (e) $\frac{\sqrt[3]{54x^5y}}{\sqrt[3]{2x^2y^{-5}}}$ (f) $\left(\frac{27x^{-4}y^2}{8x^2y^{-1}}\right)^{-\frac{2}{3}}$
- Simplify the following expressions. Assume all variables represent non-negative numbers.
(a) $\sqrt{75x^4}$ (b) $\frac{\sqrt{80x^5}}{\sqrt{5x}}$ (c) $\sqrt{63x} - \sqrt{28x}$ (d) $\sqrt{(-11)^2} + \sqrt[3]{64}$
(e) $\left(\sqrt[5]{x^2y}\right)^{\frac{5}{2}}$ (f) $\sqrt{18xy^3} \cdot \sqrt[3]{2^4x^4y^7}$ (g) $\left(8x^{-6}y^3\right)^{\frac{1}{3}}\left(x^{\frac{5}{6}}y^{-\frac{1}{3}}\right)^6$

Section 1.3: Algebra and Polynomials

- Simplify
(a) $-6^2 + 4$ (b) $3(10 - 2(1 - 4)^2)^2$ (c) $2(3xy)4(xy)$
- Multiply the following and simplify.
(a) $(2x - 3)(x^2 - 4x + 3)$ (b) $(3x - 2)^2$ (c) $(2\sqrt{x} - 1)^2$ (d) $(3x - 4)^3$
(e) $[8y + (7 - 3x)][8y - (7 - 3x)]$ (f) $(x - y - 3)(x - y + 3)$ (g) $(3x + 1)(x^2 + 9)(3x - 1)$

3. Factor completely.

- (a) $12x^4 - 18x^3 - 54x^2$ (b) $8x^2 + 33x + 4$ (c) $6x^4 + 6x^2 - 12$ (d) $16x^4 - 81$
 (e) $(5x + 2y)^2 - (5x - 2y)^2$ (f) $125x^6 - 27$ (g) $2(x + 3)^{\frac{1}{2}} - 10(x + 3)^{\frac{5}{2}}$
 (h) $3(x + 1)(2x + 3)^2 - 9(x + 1)^2(2x + 3)$ (i) $(x + 1)^{\frac{1}{3}} + x(x + 1)^{\frac{-2}{3}}$ (j) $2(x + 3)^{\frac{-1}{2}} - 5(x + 3)^{\frac{1}{2}}$
 (k) $(x^2 - 3)^2 - 4(x^2 - 3) + 3$

Section 1.4: Rational Expressions

1. Perform the indicated operations. Also state any values that should be excluded from the domain of each expressions.

- (a) $\frac{2x^2 + 8x}{8x}$ (b) $\frac{2}{5x + 1} + \frac{3}{5x}$ (c) $\frac{x^2 - 25}{x^2 + 3x - 10} \div \frac{x^2 + 7x + 10}{x^2 + 8x + 15}$ (d) $\frac{1 + x^{-1}}{1 - x^{-2}}$
 (e) $\frac{3}{5x + 2} + \frac{5x}{25x^2 - 4}$ (f) $\frac{2(x + 1)^{\frac{1}{2}} - x(x + 1)^{\frac{-1}{2}}}{x + 1}$ (g) $\frac{\frac{3}{h+1} - 3}{h}$ (h) $\frac{\frac{1}{2+x} - \frac{1}{2}}{x}$
 (i) $\frac{15x^4(x^2 - 1)^2 + 12x^2(x^2 - 1)^3}{x^4(x^2 - 1)(3x + 2)}$ (j) $\frac{8x(x + 2)^2 - 6x^2(x + 2)}{6x^3(x + 2)^6}$ (k) $\frac{x - 3}{x^2 - 4} - \frac{x + 2}{x^2 - 4x + 4} - \frac{2}{2 - x}$

2. (a) Rationalize the denominator $\frac{23}{5 + \sqrt{2}}$ (b) Rationalize the numerator $\frac{\sqrt{x + 3} - \sqrt{x}}{5}$

Section 1.5: Solving equations

1. Solve the following equations for the unknown.

- (a) $\frac{3}{x + 3} = \frac{5}{2x + 6} + \frac{1}{x - 2}$ (b) $\frac{1}{y - 3} - \frac{2}{y + 1} = \frac{8}{y^2 - 2y - 3}$ (c) $-\frac{9}{x^2} + 8 = -\frac{1}{x^4}$
 (d) $\sqrt{20 - 8a} = a$ (e) $\sqrt{x + 5} - \sqrt{x - 3} = 2$ (f) $(2x + 7)(x - 6) = -39$
 (g) $w^2 - 13w = -36$ (h) $3(y + 4)^2 - 5 = 22$ (i) $2c^2 + c - 5 = 0$ (j) $x^{-2} - 3x^{-1} - 4 = 0$

2. Solve by completing the square.

- (a) $6x^2 - 12x - 3 = 0$ (b) $3x^2 + x - 2 = 0$

Section 1.6: Modeling with Equations

See text # 25, 27, 29, 61, 63, 67, 69. Monday's worksheet will emphasize such problems.

Section 1.7: Inequalities

1. Solve

- (a) $\frac{3x}{10} + 1 \geq \frac{1}{5} - \frac{x}{10}$ (b) $-5 \leq \frac{1}{2}x - 4 < -3$ (c) $3x^2 < 8x$ (d) $\frac{x^2 - 4}{x^2 - 2x - 3} \leq 0$
 (e) $\frac{4}{x} \leq x$ (f) $-\frac{1}{x} \leq x - 2$ (g) $x + 2 \leq \frac{3}{x}$

2. Find the domain of $\frac{\sqrt{x + 3}}{\sqrt{x - 1}}$.

Section 1.8 and 1.10: Symmetries, Lines and Circles

1. Determine any symmetry. Prove your answers by applying the appropriate symmetry test.

(a) $y = x^4 + \frac{|x|}{x^4 + x^2 + 2}$ (b) $y = 2x^7 - 3x + 1$ (c) $x = y^4 - 5y^2$

2. Find the equation of the line

(a) passing through the points $P(1, 2)$ and $Q(5, -2)$

(b) passing through $P(1, 3)$ and parallel to $3x - 6y = 2$

(c) passing through $P(1, 3)$ and perpendicular to $3x - 6y = 2$

3. Find x such that $(x, 4)$ is 5 units from $(3, 1)$.

4. Find the equation of the circle that

(a) has center $(2, 1)$ and radius $r = 3$

(b) has center $(2, -3)$ and passes through the point $P(1, 1)$

5. Find the center and radius of the circle with equation $2x^2 + 2y^2 + 20x - 36y - 30 = 0$