1. Terms to know: the real (coordinate) line, inequalities, interval notation, solution set, absolute value, rectangular coordinate system, distance, mid-point, circle, radius, center of the circle, completing the square technique, semicircle, symmetry with respect to x-axis, y-axis, origin, rationalization of a denominator and/or numerator.
2. Notation to know: open, closed, half-open and infinite intervals. (sec. 1.1)
3. Know the properties of inequalities. (sec. 1.1)
4. Be able to solve linear, quadratic, absolute-value, and rational inequalities both algebraically and graphically. (sec. 1.1 + 1.2)
5. Know and be able to use the definition of the absolute value to simplify algebraic expressions. (sec. 1.2)
6. Know properties of absolute- values. (sec. 1.2)
7. Be able to solve absolute value equations. (sec. 1.2)
8. Know and be able to use the distance and midpoint formulas between two numbers on the number line. (sec. 1.3)
9. Know and be able to use the distance and midpoint formulas between two points on xy-plane. (sec. 1.4)
10. Be able to sketch the graph of a circle and semicircle. (sec. 1.4)
11. Be able to find an equation of the circle from the given information (center, diameter, radius). (sec. 1.4)
12. Be able to complete the squares on x- and y-terms to write the standard form of an equation of a circle and find the center and radius of the circle. (sec. 1.4)
13. Be able to write an equation of the upper half, lower half, right half, and left half of the circle. (sec. 1.4)
14. Be able to find the intercepts and axis of symmetry (y-axis, x-axis, and origin) of the graph. (sec. 1.4)
15. Know and be able to use factorization, binomial expansions for n = 2 and n = 3, and rationalization to simplify algebraic expressions. (sec. 1.5)
16. Any handouts given in class, any class discussions.

Partial Review Problems:

1. Write the expression without using absolute value symbols:
   a) $|x - 6|$ if $x < 6$; b) $|6 - x|$ if $x = 6$; c) $|a - b| - |b - a|$. (Student Learning Outcome) SLO 6
2. Find the center and radius of the circle: $x^2 + y^2 + 2x - 6y + 7 = 0$. SLO 12
3. Solve the given inequalities, describe its solution set using the interval notation, and graph the inequalities: a) $-(2x + 1) \geq 3$; b) $x^2 - 4x > -3$; c) $\frac{4x + 5}{x + 2} \geq 3$; d) $|3x - 5| > 2$; e) $|2x + 11| < 5$; f) $x^3 - 4x \geq 0$; g) $\frac{1}{x} < 4$; h) $x < \frac{2}{x - 1}$; i) $2x^2 - 3x - 5 \leq 0$; j) $\frac{x^2 - 2x + 3}{x + 1} \leq 1$; k) $x^2(x - 4)(x - 6)^3 \geq 0$;
   l) $x^2 - 6x + 9 \geq 0$; m) $5x > 2x^2 - 3$. SLO 2, 3, 4.
4. Find an equation of the circle with the center $(1, 3)$ that passes through $(-2, 4)$. SLO 11
5. Let $m$ be the midpoint of the line segment joining $a$ (the left endpoint) and $b$ (the right endpoint). Let $m = 15, d(a,m) = 6$. Find $a$ and $b$. SLO 8
6. Find the x- and y-intercepts, and axis of symmetry of the given graph. Also sketch the graph.
   a). $f(x) = \frac{x^2 - 1}{x}$
   b). $f(x) = -\sqrt{2x + 3}$. SLO 14
7. Sketch the graph of a) \( x = \sqrt{25 - (y - 1)^2} \); b) \( y = \sqrt{49 - x^2} \). SLO 10

8. Write the expression \(|x - 1| - |x + 2|\) without the absolute value symbols if \( x \) is in the interval
   a) \((-\infty, -2)\); b) \((-2, 1)\). SLO 5

9. Find an equation for the upper half of the circle \( x^2 + (y - 3)^2 = 4 \). SLO 13

10. Find all points on the x-axis that are 3 units from the midpoint of the line segment joining (3,4) and (-3,8). SLO 9

11. Solve the given equation: a) \( \left| \frac{1}{4} - \frac{3}{2} x \right| = 1 \); b) \( \left| \frac{x + 1}{x - 2} \right| = 5 \). SLO 7

12. Use factorization, binomial expansion or rationalization to simplify the given expression:
   a) \( \frac{x^3 - 1}{x^2 + 2x - 3} \); b) \( \frac{5(x - 1)^2 - 8(x - 1) - 13}{x} \); c) \( \frac{3}{\sqrt{2} - \sqrt{5}} \); d) \( \frac{\sqrt{4 + x} - 2}{x} \); e) \( \frac{x - 2}{\sqrt{4x + 1} - 3} \); f) \( \frac{\sqrt{x^2 + 9} - 5}{x + 4} \). SLO 15

13. Simplify the rational expression:
   a) \( \frac{x - 8}{64 - x^2} \); b) \( \frac{x^5 + 2x^4 + x^3}{x^4 - 2x^2 + 1} \); c) \( \frac{(2x + 1)^2 - 9}{x - 1} \); d) \( \frac{3(h + 1)^3 - 8(h + 1)^2 + 5}{h} \). SLO 15

14. Add or subtract the rational expressions:
   a) \( \frac{3}{x - 3} + \frac{6}{x^2 + 5x - 24} \); b) \( \frac{x}{2x - 8} - \frac{6}{x - 4} \); c) \( \frac{1}{x - 2} - \frac{8}{x^2 + 4x - 12} \). SLO 15

Answers:

1. a) \( 6 - x \); b) 0; c) 0.

2. center \((-1, 3)\), radius = \( \sqrt{3} \)

3. (a). \((-\infty, -2]\); (b). \((-\infty, 1) \cup (3, \infty)\); c). \((-\infty, -2) \cup [1, \infty)\); (d). \((-\infty, 1) \cup (\sqrt{5}, \infty)\);
   e). \((-8, -3)\); f). \([-2, 0) \cup [2, \infty)\); g). \((-\infty, 0) \cup (1/4, \infty)\); h). \((-\infty, -1) \cup (1, 2)\); i) \([-1, 5/2]\);
   j) \((-\infty, -1) \cup [1, 2]\); k) \((-\infty, 4) \cup [6, \infty)\); l) \((-\infty, \infty)\); m) \((-\frac{1}{2}, 3)\).

4. \( (x - 1)^2 + (y - 3)^2 = 10 \)

5. \( a = 9; b = 21 \).

6. (a). x-int. \((-1, 0)\) and \((1, 0)\),
   no y-int., symmetry about the origin.
   (b). x-int. \((4.5, 0)\), y-int. \((0, 3)\),
   no symmetry

7. a) 
   ![Graph of a function](image1)
   b) 
   ![Graph of a function](image2)
8. a) 3, b) -2x-1.
9. \( y = 3 + \sqrt{4 - x^2} \).
10. \((-\sqrt{5},0), (\sqrt{5},0)\).
11. a) \(-\frac{1}{2}\) or \(\frac{2}{5}\); b) \(\frac{11}{4}\) or \(\frac{3}{2}\).
12. a) \(\frac{x^2 + x + 1}{x + 3}\); b) 5x - 18; c) \(-\sqrt{2} + \sqrt{5}\); d) \(\frac{1}{\sqrt{4x + 2}}\); e) \(\frac{\sqrt{4x + 1} + 3}{4}\); f) \(\frac{x - 4}{\sqrt{x^2 + 9} + 5}\).
13. a) \(-\frac{1}{x + 8}\); b) \(\frac{x^3}{(x - 1)^2}\); c) 4(x+2); d) 3h^2 + h - 7.
14. a) \(\frac{3(x + 10)}{(x - 3)(x + 8)}\); b) \(\frac{x - 12}{2x - 8}\); c) \(\frac{1}{x + 6}\).