Chapter I topics:

- Real numbers and algebraic expressions.

- Properties of exponents and radicals.

- Polynomials and factoring.

- Rational expressions.

- Complex numbers.

- Linear equations in one variable.

- Linear inequalities in one variable.

- Rational and radical equations in one variable.

Chapter II topics:

- The Cartesian coordinate system.

- Circles.

- Linear equations in two variables.

- Slope and forms of linear equations.

- Parallel and perpendicular lines.

- Linear inequalities in two variables.

Chapter III topics:

- Relations and functions.

- Linear functions.

- Quadratic functions.

- Other common functions.

1. Simplify the exponential expression and write your answer with **only** positive exponents:

   (a) $\left(\dfrac{100^0 (x^{-1} y^3)^{-1} z^4}{x^2 y z^{-2}} \right)^{-3}$

2. Simplify the radical expressions:

   (a) $\dfrac{2}{\sqrt{3} - 5}$

3. Simplify the rational expressions:

   (a) $\dfrac{x + 2}{x - 3} - \dfrac{x - 3}{x + 5} - \dfrac{1}{x^2 + 2x - 15}$

   (b) $\dfrac{3}{2n^2 - 5n - 3} \div \dfrac{1}{2n + 1}$

4. Simplify the following complex expressions:

   (a) i^{-25}

   (b) $(4 - i)(2 + i)$

5. Factor the polynomial expressions:

   (a) $27a^2 - 72a$

6. Find the area of the circle ($A = \pi r^2$, where r is the radius of a circle):

   (a) $d = 10cm$, where d is a diameter

7. Find the solutions to the quadratic/quadratic-like equations (use any method which was considered in the class)

   (a) $-8 = -6x - 14x^2$

   (b) $2 + 11x = -5x^2$

8. Find solutions to the radical equations:

(a) $v = 7 + \sqrt{14 - 2v}$

(b) $\sqrt{54 - 2n} + 10 = 16$

9. Find solutions to the rational equations:

(a) $\dfrac{n + 7}{n + 6} = \dfrac{3}{10}$

10. Find solutions to the absolute value equations:

(a) $|2x + 5| = -2$

11. Find the equation of the line that:

(a) passes through $(5, 0)$ and is perpendicular to $-5x + 2y = 1$

(b) passes through $(2, -1)$ and is parallel to $y = -3x + 4$

12. Given the two points, find the length of the line segment between the points and the midpoint of the segment:

(a) $(3, 2)$ and $(5, 1)$

13. Graph the linear inequality:

(a) $x + y > 0$

(b) $y > -2$ and $2y > -3x - 4$

14. Graph the absolute value linear inequality:

(a) $|3y - 1| \leq 2$

15. Find the standard form for the equation of the circle:

(a) $9x^2 + 9y^2 - 18x + 36y + 44 = 0$

16. Sketch the graph:

(a) $(x + 2)^2 + y^2 = 169$

17. For each of the following relations, determine the domain and range and apply the Vertical Line Test to determine which relation is a function:

   (a) $R = \{(0,0), (-5,2), (3,3), (5,3)\}$

   (b) $3x - 4y = 17$

18. Rewrite each of the following relations as a function of x and evaluate it at $x = -1$:

   (a) $6x^2 - x + 3y = x + 2y$

   (b) $\dfrac{9y + 2}{6} = \dfrac{3x - 1}{2}$

19. Identify the domain, the codomain, and the range of the following functions:

   (a) $f : \mathbb{N} \to \mathbb{N}$ and $f(x) = x + 5$

   (b) $h : [0, \infty) \to \mathbb{R}$ and $h(x) = \sqrt{x}$

20. Determine the implied domain of the following functions:

   (a) $g(x) = \dfrac{2x}{1 - 3x}$

   (b) $h(x) = \sqrt{3 - x}$

   (c) $f(x) = \dfrac{5}{\sqrt{3 - x^2}}$

21. Among all the pairs of numbers with a sum of 10, find the pair whose product is maximum.