Pre-Calculus 11
Chapter 4: Radicals and Radical Equations

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June 16, 2025

Chapter Overview

This chapter covers the fundamentals of radicals and radical equations, including:

- Simplifying and operating with radicals
- Multiplying, dividing, and rationalizing radicals
- Solving radical equations and checking for extraneous roots
- Expanding and FOIL with radicals

1 4.1 Radicals

Key Concepts

Radical Properties

- $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$
- $\sqrt[n]{a^m} = a^{m/n}$
- Simplify radicals by factoring out perfect squares/cubes
- Add/subtract like radicals only

2 4.2 Multiplying, Dividing, and Rationalizing Radicals

Key Concepts

Operations with Radicals

- Multiply: outside $\times$ outside, inside $\times$ inside
- Divide: $\frac{a\sqrt{b}}{c\sqrt{d}} = \frac{a}{c} \times \sqrt{\frac{b}{d}}$
- Rationalize denominators by multiplying by the radical or conjugate

3 4.3 Solving Radical Equations

Key Concepts

Solving Radical Equations

1. Isolate the radical
2. Square both sides
3. Solve for x
4. **Always check for extraneous roots!**

Extraneous roots: Solutions that do not satisfy the original equation after squaring.

4 4.4 FOIL and Expanding with Radicals

Key Concepts

FOIL with Radicals

- $(a + \sqrt{b})(a - \sqrt{b}) = a^2 - b$
- Use distributive property (FOIL) for binomials with radicals
- Combine like terms and simplify

Chapter Summary

Key Takeaways

- Master radical properties and operations
- Always check for extraneous roots when solving radical equations
- Rationalize denominators for final answers
- Use FOIL to expand binomials with radicals
- Practice a variety of problems for fluency