Pre-Calculus 11
Chapter 5: Rational Expressions and Equations

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Chapter Overview

This chapter covers the fundamentals of rational expressions and equations, including:

- Simplifying rational expressions and identifying non-permissible values (NPV)
- Multiplying and dividing rational expressions
- Adding and subtracting rational expressions
- Solving rational equations and checking for extraneous solutions
- Applications of rational functions (work, rate, and motion problems)

1 5.1 Simplifying Rational Expressions and NPV

Key Concepts

Rational Expressions

- A rational expression is a fraction with polynomials in the numerator and denominator
- Non-permissible values (NPV): values that make the denominator zero
- Simplify by factoring and reducing common factors

2 5.2 Multiplying and Dividing Rational Expressions

Key Concepts

Multiplying and Dividing

- Factor all numerators and denominators first
- Reduce common factors before multiplying
- To divide, multiply by the reciprocal of the divisor
- Always state NPVs before and after simplification

3 5.3 Adding and Subtracting Rational Expressions

Key Concepts

Adding and Subtracting

- Find the lowest common denominator (LCD)
- Rewrite each expression with the LCD
- Add or subtract the numerators, keep the LCD
- State NPVs

4 5.4 Solving Rational Equations

Key Concepts

Solving Rational Equations

1. Find the LCD and multiply both sides to clear denominators
2. Solve the resulting equation
3. Always check for extraneous solutions (values that do not satisfy the original equation)
4. State NPVs

5 5.5 Applications of Rational Functions

Key Concepts

Applications

- Speed-time-distance (motion) problems
- Rate of work and mixture problems
- Set up rational equations to model and solve real-world problems

Chapter Summary

Key Takeaways

- Master simplifying, multiplying, dividing, adding, and subtracting rational expressions
- Always state and check NPVs
- When solving rational equations, check for extraneous solutions
- Apply rational equations to real-world problems involving rates and motion
- Practice a variety of problems for fluency