Precalculus

Topic: Rational Expressions

Instructions

Solve the following problems. Be sure to simplify all rational expressions and show all steps.

Practice Problems

1. **Simplify the following rational expressions:**

   i. $\frac{x^2-4}{x-2}$

   ii. $\frac{3x^2+6x}{9x}$

   iii. $\frac{x^2+5x+6}{x+2}$

   iv. $\frac{x^3-27}{x-3}$

   v. $\frac{4x^2-9}{2x-3}$

2. **Perform the indicated operations:**

   i. $\frac{x}{x+2} + \frac{3}{x+2}$

   ii. $\frac{x+1}{x^2-4} - \frac{x-1}{x^2-4}$

   iii. $\frac{2}{x+1} \cdot \frac{x+1}{x-1}$

   iv. $\frac{x^2-1}{x^2+x} \div \frac{x}{x+1}$

3. **Rationalize the denominator:**

   i. $\frac{5}{\sqrt{3}}$

   ii. $\frac{4}{1+\sqrt{5}}$

   iii. $\frac{3\sqrt{2}}{\sqrt{7}}$

   iv. $\frac{2}{\sqrt{6}-1}$

4. **Rationalize the numerator:**

   i. $\frac{\sqrt{5}}{3}$

   ii. $\frac{1-\sqrt{2}}{x}$

   iii. $\frac{\sqrt{7}-\sqrt{3}}{x^2+1}$

   iv. $\frac{\sqrt{6}+2}{x-1}$

5. **Find the excluded values for the following expressions:**

   i. $\frac{3x}{x^2-9}$

   ii. $\frac{x+2}{x^2-4x}$

   iii. $\frac{x^2-1}{x^2+x-6}$

   iv. $\frac{1}{x^2+2x+1}$

6. **Simplify the expression:**

   i. $\frac{x^2-9}{x^2+6x+9}$

   ii. $\frac{x^3+3x^2}{x^2-9}$

   iii. $\frac{x^2-4x}{x^3-4x}$

   iv. $\frac{x^4-16}{x^2-4}$

7. **Simplify the compound fractional expression:**

   i. $\dfrac{\frac{x+2}{x-1}}{\frac{x}{x+1}}$

   ii. $\dfrac{\frac{3}{x+1}}{\frac{5}{x-1}}$

   iii. $\dfrac{\frac{x^2}{x+3}}{\frac{x+3}{x}}$

   iv. $\dfrac{\frac{x+4}{x^2-4}}{\frac{x-2}{x+2}}$

Multiple Choice Questions

Choose the correct answer:

1. Simplify $\frac{x^2-9}{x-3}$:
   (a) $x - 3$
   (b) $x + 3$
   (c) $x^2 - 9$
   (d) None of the above
2. Which value of x is excluded from $\frac{x+2}{x^2-4}$?
   (a) $x = -2$
   (b) $x = 2$
   (c) $x = \pm 2$
   (d) $x = 0$
3. Perform $\frac{x+1}{x-1} + \frac{2}{x-1}$:
   (a) $\frac{x+3}{x-1}$
   (b) $\frac{x+3}{x+1}$
   (c) $\frac{x+2}{x-1}$
   (d) None of the above
4. Simplify $\frac{x^2+2x}{x^2+x}$:
   (a) $\frac{x}{x+1}$
   (b) $\frac{x+2}{x}$
   (c) x
   (d) 1
5. Solve $\frac{x+3}{x-2} = \frac{2}{x-2}$:
   (a) $x = -1$
   (b) $x = 1$
   (c) $x = 2$
   (d) No solution
