

Simplifying Rational Expressions

Simplify each expression.

1) $\frac{32n}{32n^2}$

2) $\frac{56x^3}{35x^4}$

3) $\frac{10r^2 + 30r}{15r^2}$

4) $\frac{m + 2}{3m + 6}$

5) $\frac{5x^2 + 14x - 3}{3x + 9}$

6) $\frac{2n^2 - 10n + 8}{3n^2 - 11n - 4}$

7) $\frac{3}{6v^2 + 36v} + \frac{v - 1}{6v^2 + 36v}$

8) $\frac{b - 6}{b^2 - 16} - \frac{b + 1}{b^2 - 16}$

9) $\frac{2}{2a - 2} + \frac{5}{4a^2}$

10) $\frac{6}{p - 1} + \frac{6}{p - 3}$

11) $\frac{6}{2v} - \frac{5v - 2}{10v^2 + 6v}$

12) $\frac{5}{n - 4} - \frac{n - 3}{n + 6}$

13) $\frac{8p}{2} \cdot \frac{4}{6p}$

14) $\frac{n^2 + 19n + 90}{n + 10} \cdot \frac{10}{n + 9}$

15) $\frac{1}{m + 8} \cdot \frac{5m - 40}{m - 8}$

16) $\frac{2}{6x} \cdot \frac{6x^2 - 54x}{x - 9}$

17) $\frac{4}{10} \div \frac{10r}{6}$

18) $\frac{n - 7}{n^2 - 9n + 14} \div \frac{8}{-n^2 + 4n - 4}$

$$19) \frac{x^2 + 4x - 32}{x + 9} \div \frac{10x^3 + 80x^2}{x + 9}$$

$$21) \frac{\frac{x^2}{25}}{\frac{5x}{x-3}}$$

$$20) \frac{12b + 60}{5b^2} \div \frac{12b + 60}{4}$$

$$22) \frac{\frac{m^2}{5} - \frac{25}{m}}{\frac{5}{3}}$$

Solving Rational Equations

Solve each equation. Remember to check for extraneous solutions.

$$1) \frac{1}{3v} = \frac{4v+8}{3v} + \frac{1}{v}$$

$$2) \frac{2}{a^2} = \frac{1}{a^2} - \frac{a+4}{2a^2}$$

$$3) \frac{x-5}{x} = \frac{1}{x} - 1$$

$$4) \frac{3}{x^2} = \frac{1}{2x^2} + \frac{1}{2x}$$

$$5) \frac{m+3}{4m} + \frac{1}{4m} = 1$$

$$6) 1 + \frac{1}{n} = \frac{2n-8}{n}$$

$$7) \frac{1}{2x+2} - \frac{x-4}{x+1} = \frac{3}{x+1}$$

$$8) \frac{b+6}{b^2-b} + \frac{1}{b} = \frac{3b-5}{b^2-b}$$

$$9) \frac{1}{r-4} = \frac{3r+6}{r^2-8r+16} + \frac{r-6}{r^2-8r+16}$$

$$10) \frac{1}{b+1} - \frac{1}{b^2+3b+2} = \frac{2}{b^2+3b+2}$$

Dividing Polynomials

Divide using polynomial long division.

1)
$$\frac{m^3 + 15m^2 + 58m + 14}{m + 6}$$

2)
$$\frac{7r^4 - 71r^3 + 68r^2 + 32r + 38}{r - 9}$$

3)
$$\frac{2x^4 + 7x^3 - 6x^2 + 38x - 28}{x + 5}$$

4)
$$\frac{6b^3 + 42b^2 - 42b - 7}{6b - 6}$$

5)
$$\frac{63v^4 + 29v^3 - 18v^2 + 20v + 23}{7v + 4}$$

6)
$$\frac{80b^5 + 12b^4 - 8b^3 + 72b - 20}{8b - 2}$$

7)
$$\frac{90p^5 + 72p^4 + 20p^3 + 16p^2 + 1}{10p + 8}$$

8)
$$\frac{3x^4 - 4x^3 + 5x^2 - 3x + 12}{x^2 - 2x + 3}$$

Divide using synthetic division.

9)
$$\frac{a^3 - 17a^2 + 70a + 8}{a - 9}$$

10)
$$\frac{x^4 - x^3 - 98x^2 - 67x + 39}{x + 9}$$

11)
$$\frac{n^4 + 10n^3 + 19n^2 - 38n - 46}{n + 6}$$

12)
$$\frac{p^5 + 18p^4 + 79p^3 - 24p^2 - 57p - 35}{p + 9}$$

Finding Rational Roots

State the possible rational roots for each function and the possible number of positive and negative roots. Then find the actual roots, and use them to write each polynomial in factored form.

1) $f(x) = 3x^2 + 16x + 16$

2) $f(x) = 3x^3 - 7x^2 + 5x - 1$

3) $f(x) = 4x^3 - 16x^2 + 5x - 20$

4) $f(x) = 2x^4 - 17x^2 + 35$

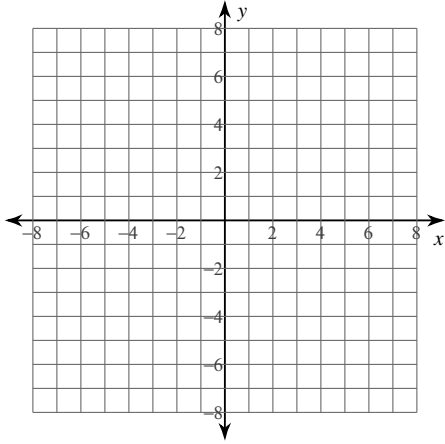
5) $f(x) = 4x^5 + 2x^4 - 26x^3 - 13x^2 - 14x - 7$

6) $f(x) = 16x^6 - 16x^4 - x^2 + 1$

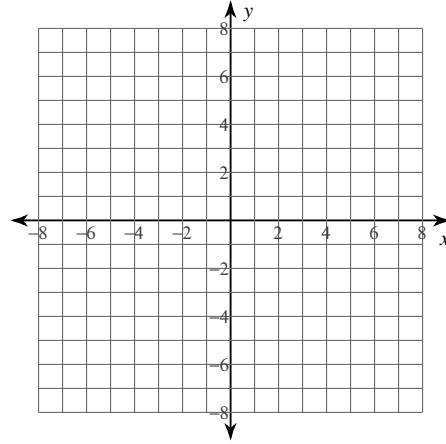
Graphing Rational Functions

Graph each function, and then identify all discontinuities, any roots, the y-intercept, and the domain/range.

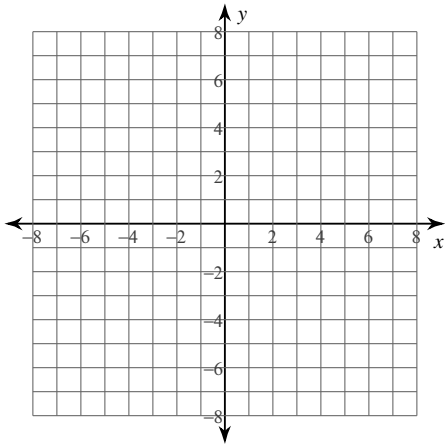
1) $f(x) = \frac{3}{x^2 + x - 2}$



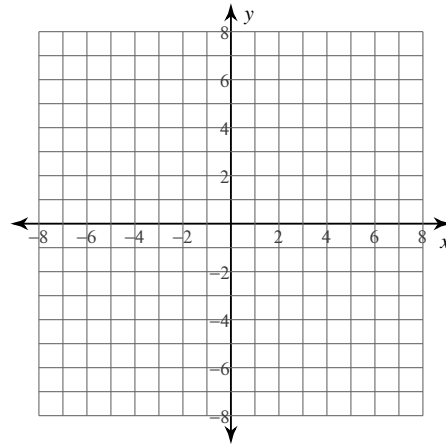
2) $f(x) = -\frac{1}{x+2}$



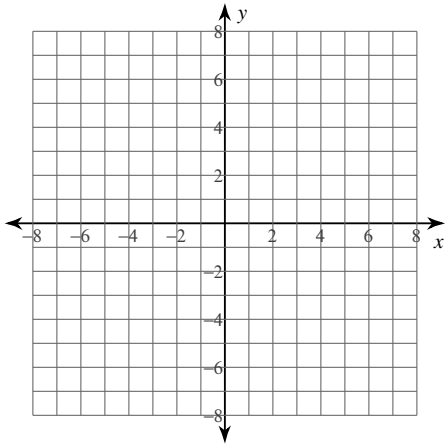
3) $f(x) = \frac{x+3}{3x+6}$



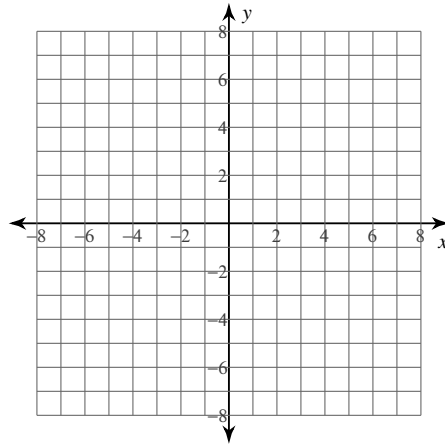
4) $f(x) = \frac{x^2 + 4x}{-2x^2 + 8}$



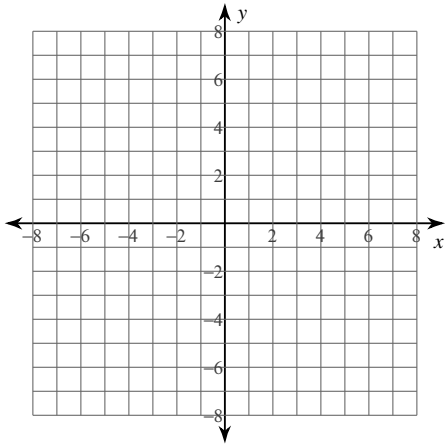
$$5) f(x) = \frac{x^2 - 2x}{2x^2 - 2x - 12}$$



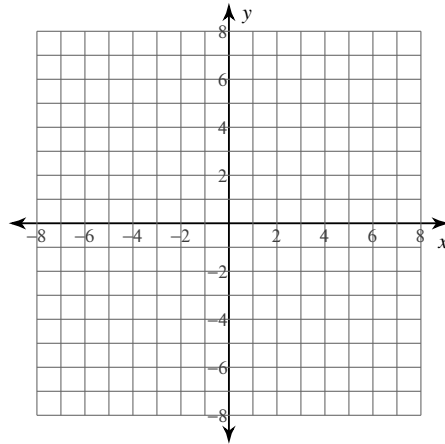
$$6) f(x) = \frac{-x + 2}{x + 4}$$



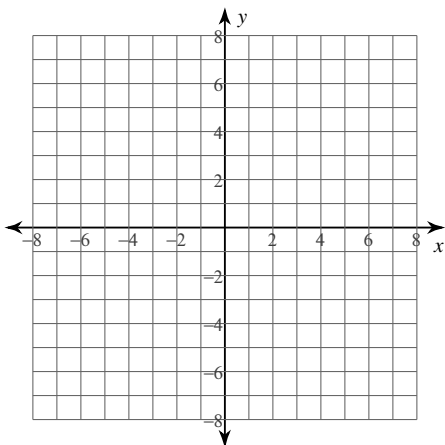
$$7) f(x) = \frac{x^2 + 4x}{3x + 6}$$



$$8) f(x) = \frac{x^3 - 3x^2 - 4x}{3x^2 - 9x}$$



$$9) f(x) = \frac{x^3 + x^2 - 6x}{-4x^2 + 12x}$$



$$10) f(x) = \frac{x^2 - x}{-3x + 9}$$

