Lesson 6.6(F'09)

Objectives: To solve polynomial inequalities graphically and analytically.
To solve rational inequalities graphically and analytically.

Analytically Solving Polynomial Inequalities

1. Write equivalent inequality with 0 on one side and *f(x)* on the other side.
2. Solve $f(x) = 0$
3. Create a sign chart by putting solutions from #2 on a number line. Use test points in each region to determine if positive or negative.
4. Identify the intervals that solve the inequality in step 1.

EXAMPLES:

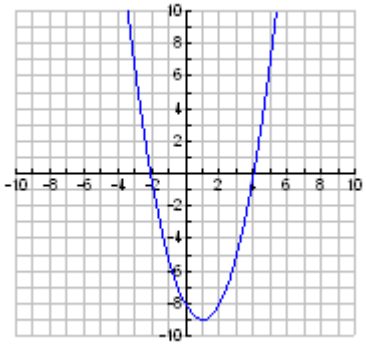
1. $x^2 - 2x \geq 8$

2. $(x - 2)(x + 4)(x + 1) < 0$

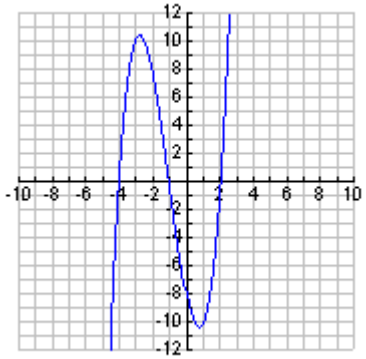
3. $x^4 - 9x^2 \leq 0$

Let's solve each of the above graphically.

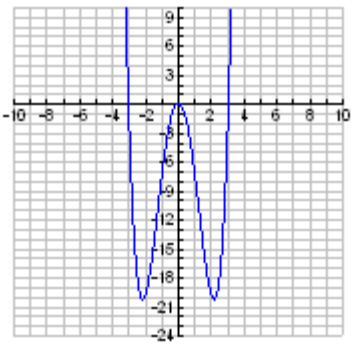
1. $x^2 - 2x \geq 8$



2. $(x - 2)(x + 4)(x + 1) < 0$



3. $x^4 - 9x^2 \leq 0$



Analytically Solving Rational Inequalities

1. Solve for zero on the right side of the inequality.
2. If necessary, get a common denominator and combine the rational expressions on the left side.
3. Set the numerator of the rational equation equal to zero and solve.
4. Find the numbers that make the denominator equal to zero.
5. Use the numbers from #3 and #4 to create a sign chart.
6. If solving an inequality with $\geq$ or $\leq$, exclude the zeros of the denominator from solution.

**** Avoid multiplying both sides of an inequality by any term containing a variable, because the term might be positive or negative****

Examples: Solve:

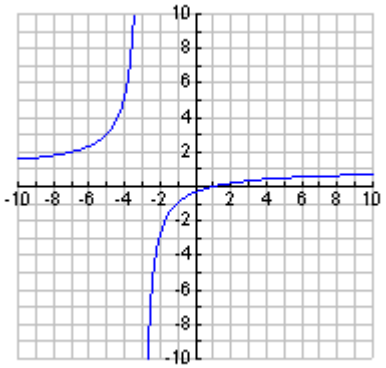
1. $\frac{x-1}{x+3} \geq 0$

2. $\frac{x-4}{x+3} < -2$

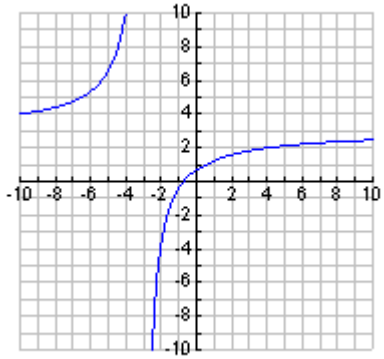
3. #10 $\frac{x}{x-1} \leq 2x + \frac{1}{x-1}$

Solve each of the above graphically.

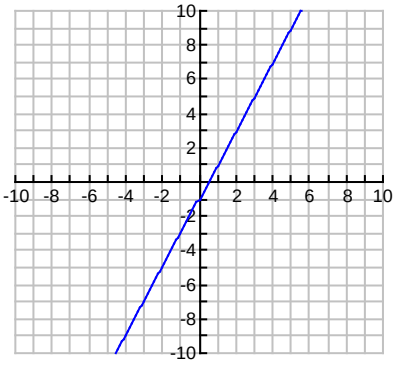
1. $\frac{x-1}{x+3} \geq 0$



2. $\frac{x-4}{x+3} < -2$

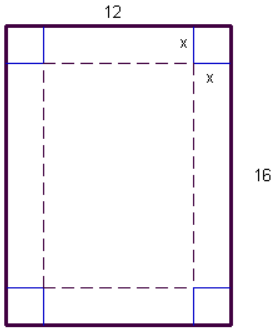


3. #10 $\frac{x}{x-1} \leq 2x + \frac{1}{x-1}$

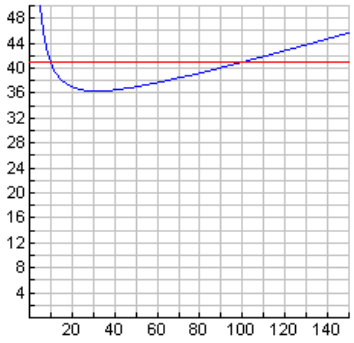


Applications

EXAMPLE A box can be formed by cutting squares out of each corner of a piece of cardboard and folding the "tabs" up. If the piece of cardboard is 12 inches by 16 inches and each side of the square that is cut out has a length x inches, the function that gives the volume of the box is $v = x(12-2x)(16-2x) = 192x - 56x^2 + 4x^3$. What size squares can be cut out to construct a box with positive volume?



EXAMPLE (page 504#28 The average cost per set for the production of a portable stereo system is given by $\overline{C} = \dfrac{100 + 30x + 0.1x^2}{x}$ where x is the number of hundreds of units produced. What number of units can be produced while keeping the average cost to at most \$41?



EXAMPLE (page 505) **Solve algebraically**.

#34 A pharmaceutical company claims that the concentration of a drug in a patient's bloodstream will be at least 10% for 8 hours. Suppose clinical tests show that the concentration of a drug (as percent) *t* hours after injection is given by $C(t)=\frac{200t}{2t^2+32}$. During what time period is the concentration at least 10%? Is the company's claim supported by the evidence? .

CW

Homework Course Compass Section 6.6 and bookwork none