

## 29 Polynomial Inequalities. Rational Inequalities.

Due:

12/14/2015 at 06:00am EST.

Students will be able to:

- Use zeros of polynomials and Intermediate Value Theorem to solve polynomial inequalities
- Use Intermediate Value Theorem to solve rational inequalities

**Functions and symbols that WeBWorK understands.**

**Links to some useful WeBWorK pages for students**

1. (1 pt) Solve the following inequality. Express the answer in interval notation.

$$2x^2 + x \geq 7$$

Answer: \_\_\_\_\_

2. (1 pt) Solve the following inequality. Express the answer in interval notation.

$$(x - 10)(x - 19) > 0$$

Answer: \_\_\_\_\_

3. (1 pt) Solve the following inequalities. Enter the answers in interval notation.

(a)  $x^2 + 7x - 8 \leq 0$

Answer: \_\_\_\_\_

(b)  $9x^2 + x + 8 > 0$

Answer: \_\_\_\_\_

4. (1 pt) Solve the following inequality. Express the answer in interval notation.

$$x^4 > 4x^2$$

Answer: \_\_\_\_\_

5. (1 pt) Solve the following inequalities. Express the answers in interval notation.

Suggestion: First answer part (a) using techniques from class and/or the text. Then, notice that parts (b)-(e) are modifications of part (a). Think about how these modifications affect the problem. Then solve parts (b)-(e) based on your answer to part (a). If you are not able to see the connections, you can always work the entire method.

(a)  $\frac{x+16}{x^2-1} > 0$

Answer: \_\_\_\_\_

(b)  $\frac{x+16}{x^2-1} \geq 0$

Answer: \_\_\_\_\_

(c)  $\frac{x+16}{x^2-1} \leq 0$

Answer: \_\_\_\_\_

(d)  $\frac{(x+16)^2}{x^2-1} \geq 0$

Answer: \_\_\_\_\_

(e)  $\frac{(x+16)^{10,001}}{(x^2-1)^{10,003}} \geq 0$

Answer: \_\_\_\_\_

6. (1 pt) Solve the following inequality. Enter the answer in interval notation.

$$\frac{x}{x-7} > -2$$

Answer: \_\_\_\_\_

7. (1 pt) Solve the following inequality. Enter the answer in interval notation.

$$\frac{(x-20)^2(x+1)^3}{(x-28)^4} > 0$$

Answer: \_\_\_\_\_

8. (1 pt) Solve the following inequality. Enter the answer in interval notation.

$$\frac{x-8}{x-5} \leq -8$$

Answer: \_\_\_\_\_

9. (1 pt) Solve the following inequality. Enter the answer in interval notation.

$$\frac{3-x}{x-10} \geq 0$$

Answer: \_\_\_\_\_

10. (1 pt) Solve the inequality

$$\frac{(x-7)^4(x-40)^{13}}{x-1316} \geq 0$$

Give your answer in interval notation.

$x \in$  \_\_\_\_\_

Note: Enter your answer without spaces. If you need  $-\infty$ , type  $-\text{inf}$ . If you need  $\infty$ , type  $\text{inf}$ . Remember that punctuation is important.

11. (1 pt) Solve the following inequality. Write the answer in interval notation. **Note:** If the answer includes more than one interval write the intervals separated by the "union" symbol, U. If needed enter  $\infty$  as *infinity* and  $-\infty$  as *-infinity*.

$$\frac{1}{x-3} \leq \frac{1}{x-4}$$

Answer: \_\_\_\_\_

12. (1 pt) Solve the following inequality. Write the answer in interval notation. If the answer involves more than one interval, write the intervals separated by the "union" symbol, U. **If needed enter  $-\infty$  as -infinity and  $\infty$  as infinity.**

$$\frac{6}{x-1} - \frac{6}{x} \geq 1$$

Answer: \_\_\_\_\_)

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13. (1 pt) Consider the inequality

$$\frac{x-5}{x^2(x+1)} > 0$$

The solution of this inequality consists of one or more of the following intervals:  $(-\infty, A)$ ,  $(A, B)$ ,  $(B, C)$ , and  $(C, \infty)$  where  $A < B < C$ .

Find  $A$  \_\_\_\_\_

Find  $B$  \_\_\_\_\_

Find  $C$  \_\_\_\_\_

For each interval, answer YES or NO to whether the interval is included in the solution.

$(-\infty, A)$  \_\_\_\_\_

$(A, B)$  \_\_\_\_\_

$(B, C)$  \_\_\_\_\_

$(C, \infty)$  \_\_\_\_\_

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14. (1 pt) Consider the inequality

$$\frac{x+6}{x+7} < -3$$

The solution of this inequality consists one or more of the following intervals:  $(-\infty, A)$ ,  $(A, B)$ , and  $(B, \infty)$  where  $A < B$ .

Find  $A$  \_\_\_\_\_

Find  $B$  \_\_\_\_\_

For each interval, answer YES or NO to whether the interval is included in the solution.

$(-\infty, A)$  \_\_\_\_\_

$(A, B)$  \_\_\_\_\_

$(B, \infty)$  \_\_\_\_\_