

## Review Exercise Set 13

Exercise 1: Solve and graph the solution set of the given polynomial inequality on a real number line.

$$2x^2 - 7x - 4 > 0$$

Exercise 2: Solve and graph the solution set of the given polynomial inequality on a real number line.

$$x^3 + x^2 - 9x - 9 \leq 0$$

Exercise 3: Solve and graph the solution set of the given rational inequality on a real number line.

$$\frac{3x}{x^2 - 4x} < 0$$

Exercise 4: Solve and graph the solution set of the given rational inequality on a real number line.

$$\frac{x+1}{2x^2+7x-4} \geq 0$$

Exercise 5: Solve and graph the solution set of the given rational inequality on a real number line.

$$\frac{2}{x+1} > \frac{5}{x-3}$$

## Review Exercise Set 13 Answer Key

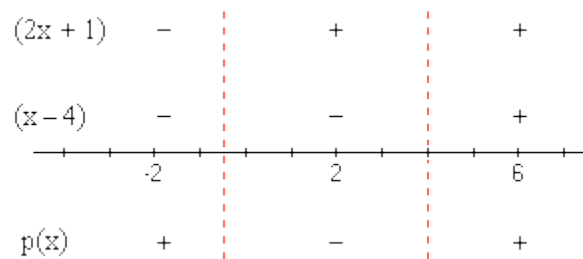
Exercise 1: Solve and graph the solution set of the given polynomial inequality on a real number line.

$$2x^2 - 7x - 4 > 0$$

Change inequality sign to equals and solve for x

$$\begin{aligned} 2x^2 - 7x - 4 &= 0 \\ (2x + 1)(x - 4) &= 0 \\ 2x + 1 = 0 \text{ or } x - 4 &= 0 \\ 2x = -1 \text{ or } x &= 4 \\ x = -\frac{1}{2} \text{ or } x &= 4 \end{aligned}$$

Determine the signs of each factor and the polynomial in each interval



Locate the positive intervals

$$\text{The solution set is } \left(-\infty, -\frac{1}{2}\right) \cup (4, \infty)$$

Exercise 2: Solve and graph the solution set of the given polynomial inequality on a real number line.

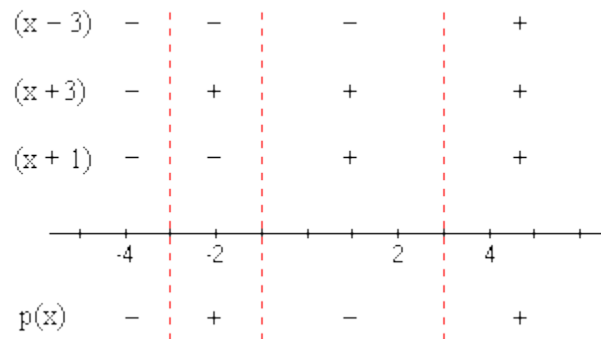
$$x^3 + x^2 - 9x - 9 \leq 0$$

Change inequality sign to equals and solve for x

$$\begin{aligned} x^3 + x^2 - 9x - 9 &= 0 \\ (x^3 + x^2) + (-9x - 9) &= 0 \\ x^2(x + 1) - 9(x + 1) &= 0 \\ (x - 3)(x + 3)(x + 1) &= 0 \\ x - 3 = 0 \text{ or } x + 3 = 0 \text{ or } x + 1 &= 0 \\ x = 3 \text{ or } x = -3 \text{ or } x &= -1 \end{aligned}$$

Exercise 2 (Continued):

Determine the signs of each factor and the polynomial in each interval



Locate the negative intervals

$$\text{The solution set is } (-\infty, -3] \cup [-1, 3)$$

Exercise 3: Solve and graph the solution set of the given rational inequality on a real number line.

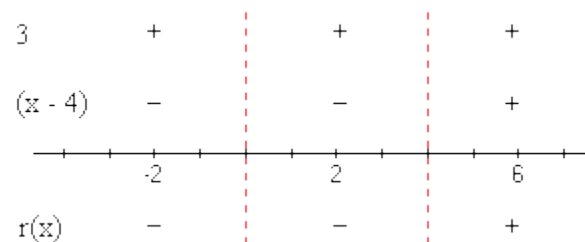
$$\frac{3x}{x^2 - 4x} < 0$$

Change inequality sign to equals and solve for x

$$\begin{aligned} \frac{3x}{x^2 - 4x} &= 0 \\ \frac{3x}{x(x - 4)} &= 0 \\ \frac{3}{x - 4} &= 0 \\ x - 4 &= 0 \\ x &= 4 \end{aligned}$$

(x cannot be 0 since it would make the original function undefined)

Determine the signs of each factor and the rational function in each interval



Exercise 3 (Continued):

Locate the negative intervals

$$\text{The solution set is } (-\infty, 0) \cup (0, 4)$$

Exercise 4: Solve and graph the solution set of the given rational inequality on a real number line.

$$\frac{x+1}{2x^2+7x-4} \geq 0$$

Change inequality sign to equals and solve for x

$$\frac{x+1}{2x^2+7x-4} = 0$$

$$\frac{x+1}{(2x-1)(x+4)} = 0$$

$$x+1=0 \quad \text{or} \quad 2x-1=0 \quad \text{or} \quad x+4=0$$

$$x=-1 \quad \quad \quad 2x=1 \quad \quad \quad x=-4$$

$$x=-1 \quad \quad \quad x=\frac{1}{2} \quad \quad \quad x=-4$$

Determine the signs of each factor and the rational function in each interval

$(x+1)$	-		-		+		+
$(2x-1)$	-		-		-		+
$(x+4)$	-		+		+		+
$r(x)$	-		+		-		+

Locate the positive intervals

$$\text{The solution set is } (-4, -1] \cup \left(\frac{1}{2}, \infty\right)$$

Exercise 5: Solve and graph the solution set of the given rational inequality on a real number line.

$$\frac{2}{x+1} > \frac{5}{x-3}$$

Combine the two fractions together

$$\begin{aligned} \frac{2}{x+1} - \frac{5}{x-3} &> 0 \\ \frac{2(x-3) - 5(x+1)}{(x+1)(x-3)} &> 0 \\ \frac{-3x-11}{(x+1)(x-3)} &> 0 \\ \frac{-(3x+11)}{(x+1)(x-3)} &> 0 \end{aligned}$$

Set each factor equal to zero and solve for x

$$\begin{aligned} 3x+11=0 \quad \text{or} \quad x+1=0 \quad \text{or} \quad x-3=0 \\ x = -\frac{11}{3} \quad \quad x = -1 \quad \quad x = 3 \end{aligned}$$

Determine the signs of each factor and the rational function in each interval

-1	-		-		-		-
$(3x+11)$	-		+		+		+
$(x+1)$	-		-		+		+
$(x-3)$	-		-		-		+
$r(x)$	+		-		+		-

Locate the positive intervals

$$\text{The solution set is } \left(-\infty, -\frac{11}{3}\right) \cup (-1, 3)$$