

Solve the polynomial inequality graphically.

13)  $x^3 - x^2 - 2x \geq 0$

14)  $3x^4 - 5x^3 - 12x^2 + 12x + 16 < 0$

Determine the real values of x that cause the function to be a) zero, b) undefined, c) positive, and d) negative

Zero  $\rightarrow$  top zero

Undefined  $\rightarrow$  bottom zero

A)  $f(x) = \frac{x-4}{(3x+2)(x+3)}$

$3x+2=0 \quad x+3=0$   
 $x = -\frac{2}{3} \quad x = -3$

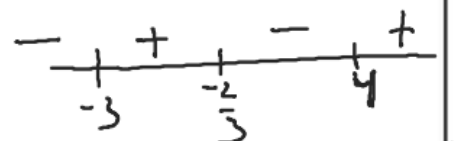
Sign chart  
include zeros  
& undefined

a) Zero  $x=4$

b) Undefined  $x = -\frac{2}{3}, -3$

c) Pos  $(-3, -\frac{2}{3}) \cup (4, \infty)$

d) Neg  $(-\infty, -3) \cup (-\frac{2}{3}, 4)$



$f(-4) = \frac{-4-4}{(3(-4)+2)(-4+3)} = \frac{-8}{(-10)(-1)} = \frac{-8}{10} = -\frac{4}{5}$

$f(-1) = \frac{-1-4}{(3(-1)+2)(-1+3)} = \frac{-5}{(-1)(2)} = \frac{-5}{-2} = \frac{5}{2}$

$f(5) = \frac{5-4}{(3(5)+2)(5+3)} = \frac{1}{(17)(8)} = \frac{1}{136}$

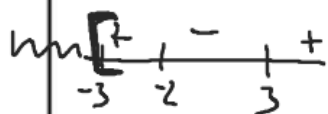
$x+3 > 0$

a) Zero  $x=3$

b) unde  $x = -2, x < -3$

c) Pos  $(-3, -2) \cup (3, \infty)$

d) Neg  $(-2, 3)$



$f(-2.5) = \frac{-2.5-3}{(-2.5+2)(-2.5+3)} = \frac{-5.5}{(-0.5)(0.5)} = \frac{-5.5}{-0.25} = 22$

C)  $f(x) = \frac{\sqrt{x-3}}{(x+2)(x-5)}$

a) Zero  $x=3$

b) Undefined  $x = -2, 5, x < 3$

c) Pos  $(5, \infty)$

d) Neg  $(3, 5)$



When writing intervals use brackets when necessary on zero's and parenthesis always on VA

Zeros

$$x^2 - x - 2 = 0$$

$$(x-2)(x+1) = 0$$

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

Undefined

$$x^2 + 8x - 9 = 0$$

$$(x+9)(x-1) = 0$$

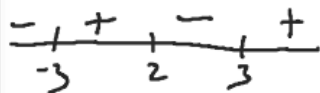
$$x = -9 \quad x = 1$$

Solve the inequality

$$A) \frac{x-2}{x^2-9} < 0$$

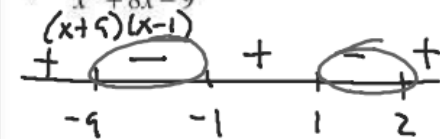
$$\text{Zero } x = 2$$

$$\text{Und } x = \pm 3$$



$$(-\infty, -3) \cup (2, 3)$$

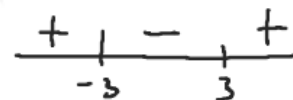
$$C) \frac{(x-2)(x+1)}{x^2+x-2} \leq 0$$



$$(-9, -1] \cup (1, 2]$$

$$B) \frac{x^2-9}{x^2+9} \geq 0 \quad \text{Zeros: } x = \pm 3$$

Und: None



$$(-\infty, -3] \cup [3, \infty)$$

$$D) \frac{x^3-9x}{x^2+4} \geq 0 \quad \text{Zeros}$$

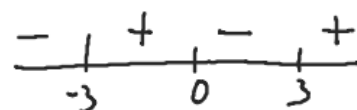
$$x^3 - 9x = 0$$

$$x(x^2-9) = 0$$

$$x(x-3)(x+3) = 0$$

Zeros,  $x = 0, \pm 3$

Und None



$$[-3, 0] \cup [3, \infty)$$