Notes Section 2.8 Solving Inequalities in One Variable- Polynomial Inequalities

Examples:

1) Determine the x-values that cause the polynomial function to be

a) zero b) positive $f(x) > 0$ c) negative $f(x) < 0$

$$f(x) = (2x^2 + 5)(x-8)^2(x+1)^3$$

$2x^2+5=0$ $x^2 = -\frac{5}{2}$ $\pm\sqrt{-\frac{5}{2}}$ not real

$x-8=0$ $x=8$

$x+1=0$ $x=-1$

Using a SIGN CHART

Process

1) Find the key numbers and draw a number line arranging the key numbers from least to greatest
2) Determine the test intervals
3) Choose an x value in each interval to test
4) Interpret the results and answer all questions

$x=-2$ $x=0$ $x=9$

$- - - - - -$ (-1) $+ + + + + + +$) 8 ($+ + + + + + +$

$(+)(-)^2(-)$ $(+)(-)^2(+)^3$ $(+)(+)^2(+)^3$

a) zeros $x=-1$, $x=8$

b) pos $f(x)>0$ $(-1,8) \cup (8,\infty)$

c) neg $f(x)<0$ $(-\infty,-1)$

2) Solve the polynomial inequality using a sign chart. Factor first!

$$x^2 - 5x - 6 < 0$$

$(x-6)(x+1) < 0$

$x=-2$ $x=0$ $x=7$

$+ + + + + + +$ (-1) $- - - - - - -$ (6) $+ + + + + +$

$(-)(-)$ $(-)(+)$ $(+)(+)$

Zeros $x=6$ $x=-1$ test intervals: $(-\infty,-1)$ $(-1,6)$ $(6,\infty)$

$x^2-5x-6<0$ for the interval

$\boxed{(-1,6)}$

3) Solve the polynomial inequality using a sign chart. Factor first!

what is the degree?

$$(x+1)(x^2-3x+2) \geq 0$$

$(x+1)(x-2)(x-1) \geq 0$

zeros: $x=-1$ $x=1$ $x=2$

$x=-2$ $x=0$ $x=1.5$ $x=3$

$- - - - -$ -1 $+ + + + + +$ 1 $- - - - -$ 2 $+ + + + +$

$(-)(-)(-)$ $(+)(-)(-)$ $(+)(-)(+)$ $(+)(+)(+)$

Show me end behavior w/ arms

So $(x+1)(x^2-3x+2) \geq 0$ for intervals

$[-1,1] \cup [2,\infty)$