Polynomial Inequalities

When solving a polynomial inequality,

1. Determine the critical points (Find the ZEROS... BE SURE one side of inequality = 0!)
2. Graph the solution. Domain values that make inequality TRUE! > or ≥ means ABOVE axis; < or ≤ means BELOW axis
3. Write the solution as an inequality or in interval notation.

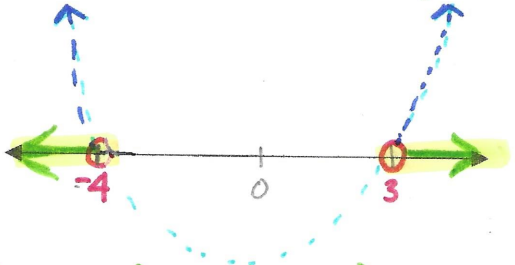
Use solid points for ≥ or ≤ and open points for > or <.

One way to help visualize the solution is to imagine the inequality's left and right sides are functions. Consider the domain where the polynomial is above or below the horizontal line represented by the constant.

1. $(x-3)(x+4)>0$ — above

+quadratic ↑ ↑

critical points: $(x-3)(x+4)=0$; $x-3=0$; $x+4=0$; $x=3,-4$

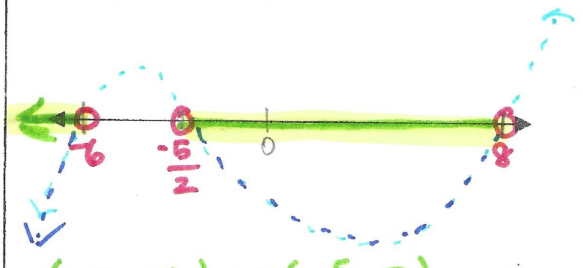


$(-\infty,-4) \cup (3,\infty)$ or $\{x \mid -\infty < x < -4 \text{ or } 3 < x < \infty\}$

2. $(x+6)(2x+5)(x-8)<0$ — below

+cubic ↙ ↗

critical points: $(x+6)(2x+5)(x-8)=0$; $x+6=0$; $2x+5=0$; $x-8=0$; $x=-6,-\frac{5}{2},8$



$(-\infty,-6) \cup (-\frac{5}{2},8)$ or $\{x \mid x < -6 \text{ or } -\frac{5}{2} < x < 8\}$

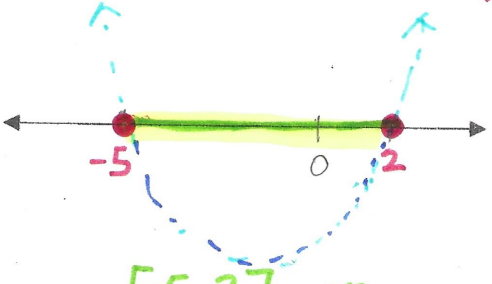
3. $x^2+3x-8 \le 2$ — below

$-2 \quad -2$

$x^2+3x-10 \le 0$

+quadratic

critical points: $(x+5)(x-2)=0$; $x+5=0$; $x-2=0$; $x=-5,2$



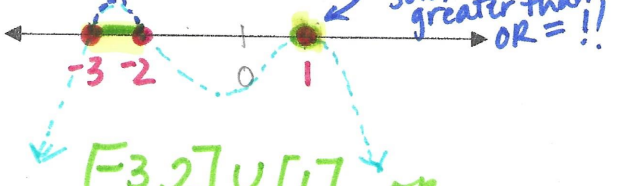
$[-5,2]$ or $\{x \mid -5 \le x \le 2\}$

4. $-7(x+2)(x-1)^2(x+3) \ge 0$ — above

− 4th degree ↙ ↘

critical points: $-7(x+2)(x-1)^2(x+3)=0$; $x+2=0$; $x-1=0$; $x+3=0$; $x=-2,1,-3$

don't forget! solution says greater than OR = !!



$[-3,2] \cup [1]$ or $\{x \mid -3 \le x \le 2 \text{ or } x = 1\}$