Task 3: Practice **Name:** _____

Solve each inequality. Give your answer in interval notation.

1. $|2x - 3| - 5 > 0$

   $|2x - 3| > 5$

   $2x - 3 > 5$ *or* $2x - 3 < -5$

   $2x > 8$ *or* $2x < -2$

   $x > 4$ *or* $x < -1$

Interval: $(-\infty, -1) \cup (4, \infty)$

2. $|3x - 5| \leq -2$

   No solution! An absolute value can never be less than a negative number

3. $2x^2 + 2x \geq 112$

   $2x^2 + 2x - 112 \geq 0$

   $2(x^2 + x - 56) \geq 0$

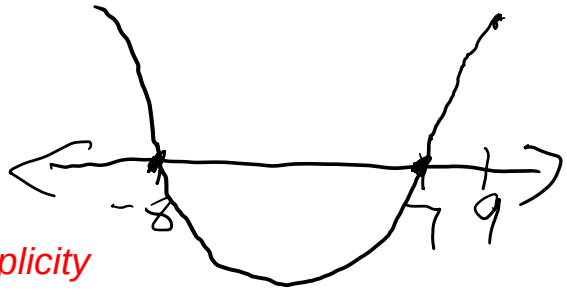
   $x^2 + x - 56 \geq 0$

   $(x + 8)(x - 7) \geq 0$

   Zeros: x= -8, 7

   Note both have odd multiplicity

   Interval: $(-\infty, -8] \cup [7, \infty)$



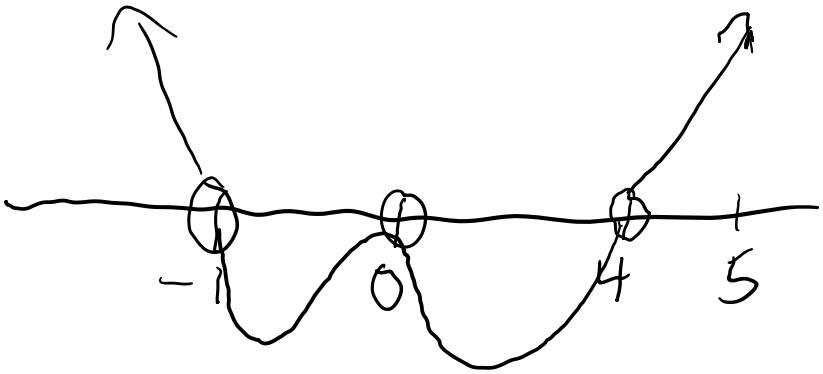
4. $x^4 - 3x^3 < 4x^2$

$x^4 - 3x^3 - 4x^2 < 0$

$x^2(x^2 - 3x - 4) < 0$

$x^2(x-4)(x+1) < 0$

Zeros: 0(mult 2), 4, -1



Notice on our rough sketch, the even multiplicity and its impact at 0. The function does not cross the x-axis when it hits a zero of even multiplicity.

Interval: $(-1, 0) \cup (0, 4)$

5. $x - 2 > |x^2 - 4|$ *This mixes absolute value with polynomials. To begin this problem, we will write this inequality with the absolute value on the left, and then make appropriate statements to remove the absolute value signs.*

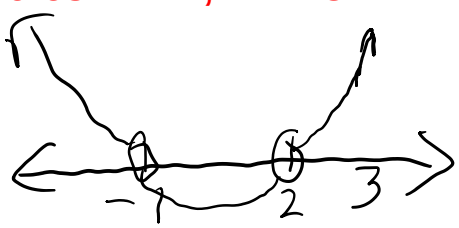
$|x^2 - 4| < x - 2$

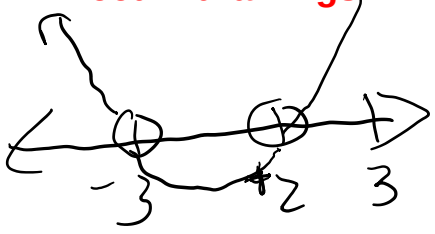
$x^2 - 4 < x - 2$ ***OR*** $x^2 - 4 > -(x - 2)$

$x^2 - x - 2 < 0$ ***OR*** $x^2 + x - 6 > 0$

$(x-2)(x+1) < 0$ ***OR*** $(x+3)(x-2) > 0$

Zeros: x = 2, -1 OR x = -3, 2 We will need 2 drawings





Intervals: $(-1, 2)$ ***OR*** $(-\infty, -3) \cup (2, \infty)$