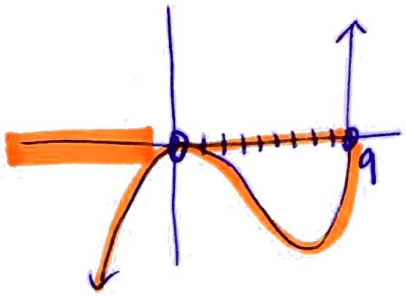
Honors Math III
Polynomial Inequalities

Math key

Solve.

1. $t^3 < 9t^2$

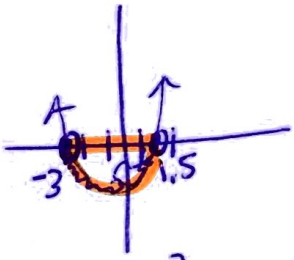
$t^3 < 9t^2$
$t^3 - 9t^2 < 0$
$t^2(t-9) < 0$
$t=0$ DR
$t=9$



$\{t \mid t<9, t\neq 0\}$
OR $\{t \mid t<0, 0<t<9\}$

2. $9 - 3t - 2t^2 > 0$

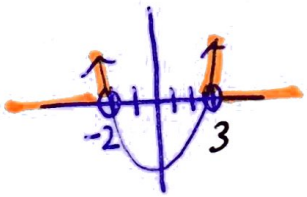
$-2t^2 - 3t + 9 > 0$
$-(2t^2 + 3t - 9) > 0$
$2t^2 + 3t - 9 < 0$
$(2t-3)(t+3) < 0$
$t = \frac{3}{2}$
$t = -3$



$\{t \mid -3 < t < 1.5\}$

3. $(x^2 - 1) > (x + 5)$

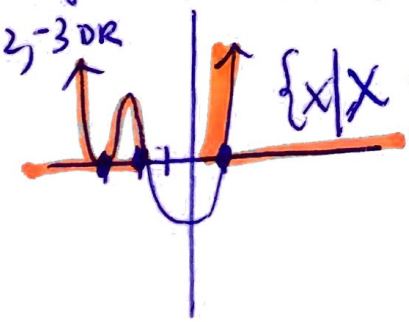
$x^2 - x - 6 > 0$
$(x+2)(x-3) > 0$
$x = -2$
$x = 3$



$\{x \mid x < -2 \text{ or } x > 3\}$

4. $(x^2 + 2x - 3)(x^2 + 5x + 6) \geq 0$

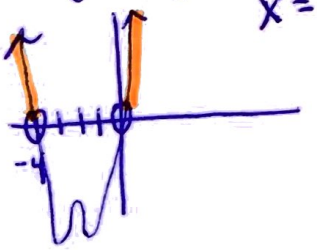
$(x-1)(x+3)(x+2)(x+3) \geq 0$
$x = 1, -2, -3$ DR



$\{x \mid x \leq -2 \text{ or } x \geq 1\}$

5. $(x^2 + 4)(x^2 + 4x) > 0$

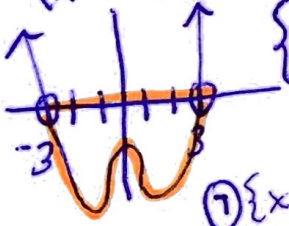
$(x^2+4)(x(x+4)) > 0$
$x = 0, -4, \pm 2i$



⑤ $\{x \mid x < -4 \text{ or } x > 0\}$

6. $x^4 - 18 < 7x^2$

$x^4 - 7x^2 - 18 < 0$
$(x^2 + 2)(x^2 - 9) < 0$ $x = \pm 3, \pm i\sqrt{2}$
$(x^2+2)(x+3)(x-3) < 0$

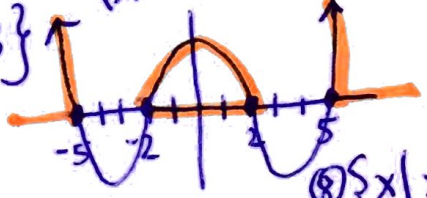


$\{x \mid -3 < x < 3\}$

⑦ $\{x \mid x \leq -5 \text{ or } -2 \leq x \leq 2 \text{ or } x \geq 5\}$

7. $x^4 + 100 \geq 29x^2$

$x^4 - 29x^2 + 100 \geq 0$
$(x^2 - 4)(x^2 - 25) \geq 0$
$(x+2)(x-2)(x+5)(x-5) \geq 0$
$x = \pm 2, \pm 5$



⑧ $\{x \mid x \neq 0, x \neq 3\}$

8. $x^2(x^2 + 9) > 6x^3$

$x^4 + 9x^2 - 6x^3 > 0$
$x^2(x^2 - 6x + 9) > 0$
$x^2(x-3)(x-3) > 0$
$x = 0$ DR, 3 DR