PAP PreCalculus
HW: Nonlinear Inequalities

Name: Key

**Solve the inequality and graph the solution on the real number line. Use your calculator to verify your solution graphically.**

1. $(x+2)^2 < 25$

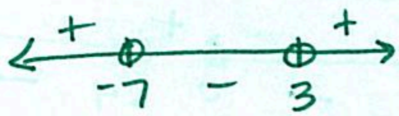
$\boxed{(-7,3)}$

↑↑ $x^2+4x+4-25<0$

$x^2+4x-21<0$

$(x+7)(x-3)<0$

$x=-7 \quad x=3$



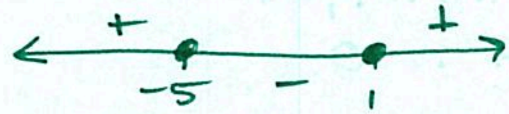

2. $x^2+4x+4 \geq 9$

↑↑ $x^2+4x+4-9 \geq 0$

$x^2+4x-5 \geq 0$

$(x+5)(x-1) \geq 0$

$x=-5 \quad x=1$

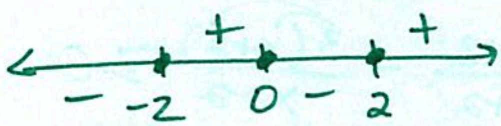



$\boxed{(-\infty,5] \cup [1,\infty)}$

3. $x^3-4x \geq 0$

↓↑ $x(x^2-4) \geq 0$

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




$\boxed{[-2,0] \cup [2,\infty)}$

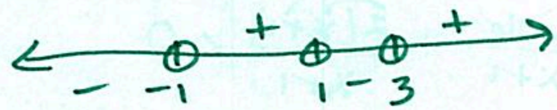
4. $x^3-3x^2-x > -3$

↓↑

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

$x^2(x-3)-1(x-3)>0$

$(x-3)(x-1)(x+1)>0$



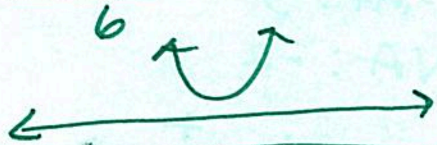

$\boxed{(-1,1) \cup (-3,\infty)}$

5. $3x^2-11x+16 \leq 0$

Doesn't factor

$\dfrac{11 \pm \sqrt{11^2-4(3)(16)}}{2(3)}$

$\dfrac{11 \pm \sqrt{-71}}{6}$ imag.



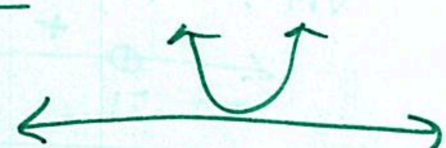
$\boxed{\text{NO real solution}}$

6. $x^2+3x+8>0$

Doesn't factor

$\dfrac{-3 \pm \sqrt{3^2-4(1)(8)}}{2}$

$\dfrac{-3 \pm \sqrt{-23}}{2}$



$\boxed{\text{All real \#'s}}$

Turn over →

**Solve the inequality and graph the solution on the real number line. Use your calculator to verify your solution graphically.**

7. $\frac{1}{x} - x \cdot \frac{x}{x} \geq 0$

$\frac{1}{x} - \frac{x^2}{x} > 0$

$\frac{1-x^2}{x} > 0 \qquad \frac{(1-x)(1+x)}{x} > 0$

x-int: 1, −1

VA: 0

+    + 

−1 − 0   1 −

$\boxed{(-\infty,-1) \cup (0,1)}$

8. $\frac{1}{x} - 4\frac{x}{x} \leq 0$

$\frac{1}{x} - \frac{4x}{x} < 0$

$\frac{1-4x}{x} < 0$

x-int: $\frac{1}{4}$

VA: 0

+

−   0   1/4   −

$\boxed{(-\infty,0) \cup (\frac{1}{4},\infty)}$

9. $\frac{x+6}{x+1} - 2\frac{x+1}{x+1} \leq 0$

$\frac{x+6}{x+1} - \frac{2(x+1)}{x+1} < 0$

$\frac{x+6-2x-2}{x+1} < 0$

$\frac{-x+4}{x+1} < 0$

x-int: 4

VA: −1

+

−   −1   4   −

$\boxed{(-\infty,-1) \cup (4,\infty)}$

10. $\frac{x+12}{x+2} - 3\frac{x+2}{x+2} \geq 0$

$\frac{x+12}{x+2} - \frac{3(x+2)}{x+2} \geq 0$

$\frac{x+12-3x-6}{x+2} \geq 0$

$\frac{-2x+6}{x+2} \geq 0$

$\frac{-2(x-3)}{x+2} \geq 0$

x-int: 3

VA: −2

+

−   −2   3   −

$\boxed{(-2,3]}$