TEST CHP 4 FRI (no calc!)

No calculator, please.

Solve each.

$x^3 - 6x = 0$

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

2. $x^3 = 6x$

$x(x^2 - 6) = 0$

$x = 0 \ or \ x^2 - 6 = 0$

$x = \dfrac{1 \pm \sqrt{17}}{8}$

$x^2 = 6$

$x = 0 \ or \ x = \pm\sqrt{6}$

Completely factor.

3. $27x^3 - 1000$

4. $10x^2 + 11xy - 6y^2$

$(3x - 10)(9x^2 + 30x + 100)$

$(5x - 2y)(2x + 3y)$

Find and graph the solution set.

1. $x^2 - 2x - 8 < 0$

1. First find the zeros

2. Put these on graph with 0 above it

3. Use a sign chart to determine sign in each region.

4. Look at original inequality and shade graph. (<0 is negative)
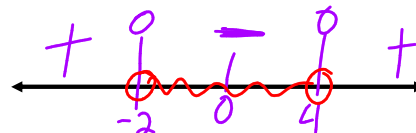
5. Write solution.

$x^2 - 2x - 8 = 0$

$(x - 4)(x + 2) = 0$

$x - 4 = 0 \ or \ x + 2 = 0$

$x = 4 \quad or \quad y = -2$

sign chart

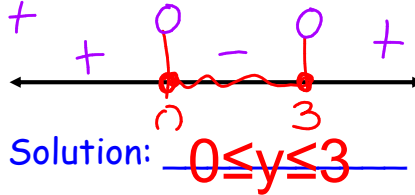| x	$(x-4)(x+2)$
-3	$(-3-4)(-3+2)$ $(-)(-) = +$
0	$- \ + \ = \ -$
5	$+ \ + \ = \ +$

Solution: $-2 < x < 4$

Find and graph the solution set.

2. $y^2 - 3y \leq 0$

Find zeros
$y^2 - 3y = 0$
$y(y-3) = 0$
$y = 0$ or $y-3 = 0$
$\qquad\qquad y = 3$

y	y(y-3)
-1	- - = +
1	+ - = -
10	+ + = +

Shade
less than or equal
to 0

$\xleftarrow{\qquad +\qquad \overset{0}{\underset{0}{\bullet}}\quad -\quad \overset{0}{\underset{3}{\bullet}}\quad +\qquad}\rightarrow$

Solution: $0 \leq y \leq 3$
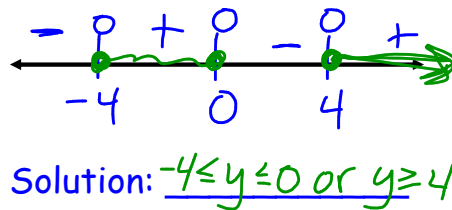
Find and graph the solution set.

3. $y^3 \geq 16y$ $y^3 - 16y \geq 0$

find zeros
$y^3 = 16y$
$y^3 - 16y = 0$
$y(y^2 - 16) = 0$
$\boxed{y(y+4)(y-4) = 0}$
$y = 0$ or $y+4 = 0$ or $y-4 = 0$
$\qquad\qquad y = -4 \qquad y = 4$

$\xleftarrow{\quad -\quad \overset{0}{\underset{-4}{\bullet}}\quad +\quad \overset{0}{\underset{0}{\bullet}}\quad -\quad \overset{0}{\underset{4}{\bullet}}\quad +\quad}\twoheadrightarrow$

Solution: $-4 \leq y \leq 0$ or $y \geq 4$

greater than or equal to zero
(positive #'s are greater than 0!)
test all regions

y	y(y+4)(y-4)
-5	- - - = -
-2	- + - = +
3	+ + - = -
5	+ + + = +

Find and graph the solution set.

where is it greater than 0

4. $12x - x^2 < 36$

$-x^2 + 12x - 36 < 0$

$\dfrac{}{-1} \; \dfrac{}{-1} \; \dfrac{}{-1} \; \dfrac{}{-1}$

$x^2 - 12x + 36 > 0$

$(x-6)(x-6) > 0$

Find zero

$(x-6)(x-6) = 0$

$x - 6 = 0$

$x = 6$

x	$(x-6)(x-6)$	
0	$-- = +$	
8	$++ = +$	
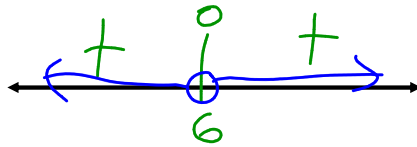
Solution: $x < 6$ or $x > 6$

Find and graph the solution set.

greater than 0

5. $4k^2 - 8k > 0$

Find zeros

$4k^2 - 8k = 0$

$4k(k-2) = 0$

$4k = 0$ or $k - 2 = 0$

$k = 0 \qquad k = 2$

k	$4k(k-2)$	
-1	$-- = +$	
1	$+ - = -$	
3	$++ = +$	
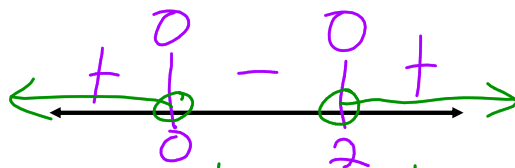
Solution: $k < 0$ or $k > 2$

Find and graph the solution set.

6. $(y-1)(y+1) < y+1$

$y^2 - 1 < y + 1$
$\underline{-y - 1} \qquad \underline{-y - 1}$

$\boxed{y^2 - y - 2 < 0}$

Find zeros

$y^2 - y - 2 = 0$

$(y-2)(y+1) = 0$

$y - 2 = 0 \quad \text{or} \quad y + 1 = 0$

$y = 2 \qquad \text{or} \quad y = -1$

y	$(y-2)(y+1)$
-2	$- \; - \; = +$
0	$- \; + \; = -$
3	$+ \; + \; = +$

less than 0

Solution: $\underline{-1 < y < 2}$