

Key

1. Solve each equation below for x without graphing. Show all of your work.

a. $(\frac{x+1}{2} - 3 = \frac{x}{4}) = 2$

b. $x^2 + 3x - 18 = 0$

c. $2(x-1)^2 + 3 = 131$

d. $4|x+6| - 1 = 7$

$4(\frac{x+1}{2} - 3 = \frac{x}{4}) \cdot 4$
 $4(x+1-6 = \frac{2x}{4}) \cdot 4$
 $4x+4-26 = 2x$
 $4x-22 = 2x$
 $4x-2x = 22$
 $2x = 22$
 $x = 11$

$(x+6)(x-3)$
 $x = -6, x = 3$

$2(x-1)^2 = 128$
 $\frac{2(x-1)^2}{2} = \frac{128}{2}$
 $(x-1)^2 = 64$

$4|x+6| = 8$
 $\frac{4|x+6|}{4} = \frac{8}{4}$
 $|x+6| = 2$
 $x+6 = 2$
 $x = -4$
 $x+6 = -2$
 $x = -8$

$x-1 = 8$
 $x = 9$
 $x-1 = -8$
 $x = -7$

e. $2\sqrt{x+10} - 1 = 5$

f. $(\frac{x^3+7}{5} = 3) \cdot 5$

g. $(\sqrt[3]{2x-1} = -1)^3$

h. $(x-1)(x+5) = 0$

$2\sqrt{x+10} = 6$
 $\frac{2\sqrt{x+10}}{2} = \frac{6}{2}$
 $(\sqrt{x+10})^2 = (3)^2$
 $x+10 = 9$
 $x = -1$

$x^3 + 7 = 15$
 $x^3 = 8$
 $x = 2$

$2x-1 = -1$
 $2x = 0$
 $x = 0$

~~x = 1~~
~~x = -5~~

2. Solve each inequality below. Show your work. Represent your solution on a number line and as an inequality. Use answers from above as boundary points

a. $\frac{x+1}{2} - 3 \leq \frac{x}{4}$

b. $x^2 + 3x - 18 < 0$

c. $2(x-1)^2 + 3 \geq 131$

d. $4|x+6| - 1 > 7$

$\frac{x+1}{2} - 3 \leq \frac{x}{4}$
 $\frac{x+1}{2} - 3 \leq 0$
 $\frac{x+1}{2} \leq 3$
 $x+1 \leq 6$
 $x \leq 5$

$(-6)^2 + 3(-6) - 18 < 0$
 $36 - 18 - 18 < 0$
 $0 < 0$
 $6 < 3$

$2(-10-1)^2 + 3 \geq 131$
 $2(-11)^2 + 3 \geq 131$
 $2(121) + 3 \geq 131$
 $242 + 3 \geq 131$
 $245 \geq 131$

$4|-10+6| - 1 > 7$
 $4|-4| - 1 > 7$
 $16 - 1 > 7$
 $15 > 7$

e. $2\sqrt{x+10} - 1 < 5$

f. $\frac{x^3+7}{5} \leq 3$

g. $\sqrt[3]{2x-1} \geq -1$

h. $(x-1)(x+5) < 0$

$2\sqrt{x+10} - 1 < 5$
 $2\sqrt{x+10} < 6$
 $\sqrt{x+10} < 3$
 $x+10 < 9$
 $x < -1$

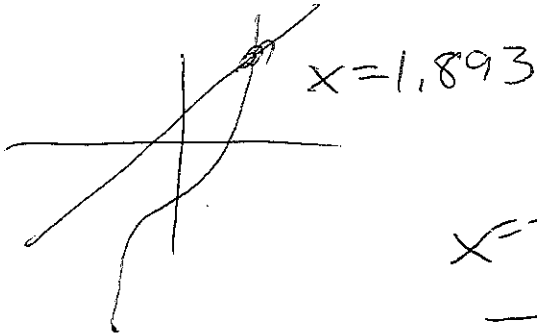
$\frac{x^3+7}{5} \leq 3$
 $x^3+7 \leq 15$
 $x^3 \leq 8$
 $x \leq 2$

$\sqrt[3]{2x-1} \geq -1$
 $2x-1 \geq -1$
 $2x \geq 0$
 $x \geq 0$

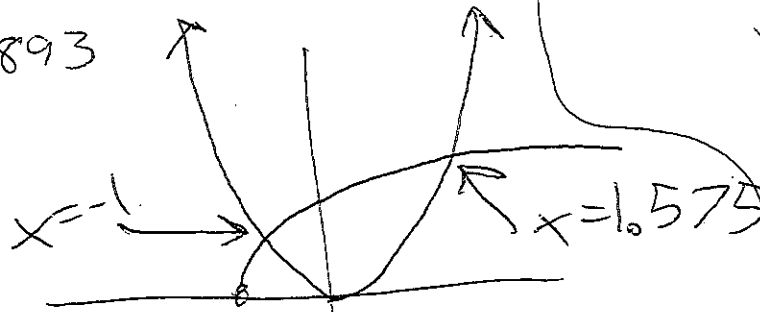
$(-10-1)(-10+5) < 0$
 $(-11)(-5) < 0$
 $55 < 0$

3. Use the TI-84 or desmos.com to solve the equations below. Round your answers to 2 decimal places. Sketch the graph you used to find your solution.

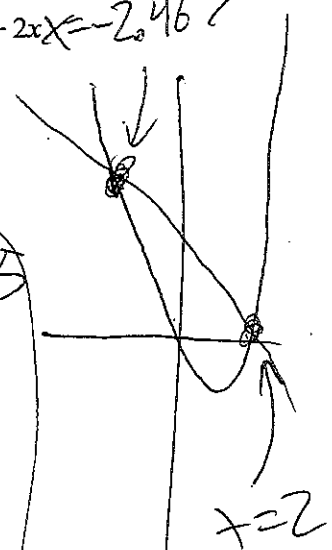
a. $x^3 - 2 = 2x + 1$



b. $\sqrt{2x+3} = x^2$



c. $3^x - 4x = 5 - 2x$ $x = -2.467$



4. Solve the equations below by factoring and using the Zero Product Property:

a. $x^2 + 3x - 18 = 0$

$(x+6)(x-3)$
 $x = -6, x = 3$

b. $x^2 + 4x + 4 = 0$

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

c. $x^2 - 5x = 0$

$(x-5)(x+0)$
 $x = 5, x = 0$