Warm Up:

Write the solution set for
$2x^2 - 5x + 4 = 0$

$a=2 \quad b=-5 \quad c=4$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{5 \pm \sqrt{25-32}}{4}$$

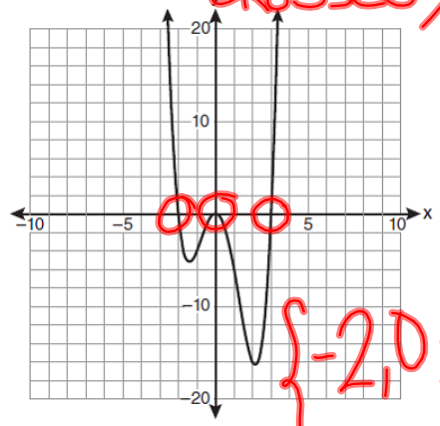
$$x = \frac{5 \pm \sqrt{-7}}{4}$$

$$\rightarrow \frac{5}{4} \pm \frac{\sqrt{7}}{4}i$$

Solving Higher Degree Equations Graphically

Ex. #1: The graph of y=f(x) is shown below. State the set of all real solutions for which f(x)=0.

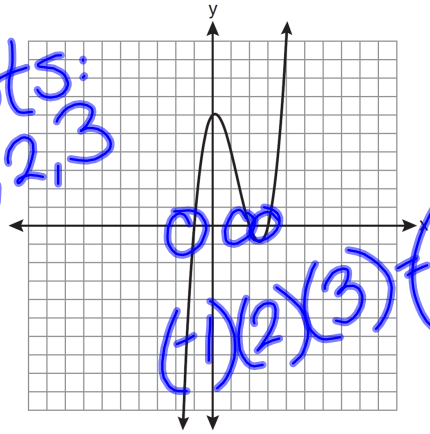
crosses x-axis



{-2,0,3}

Ex. #2: The graphs of $y=x^3-4x^2+x+6$ is shown below. What is the product of the roots of the equation

$x^3-4x^2+x+6=0$?



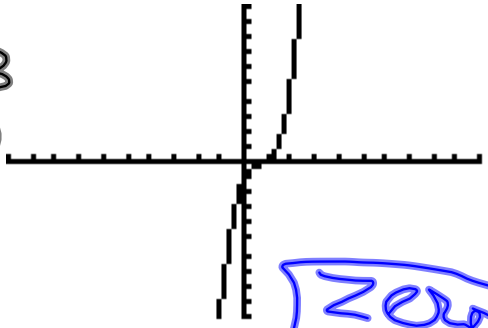
Roots: -1, 2, 3

(-1)(2)(3) = -6

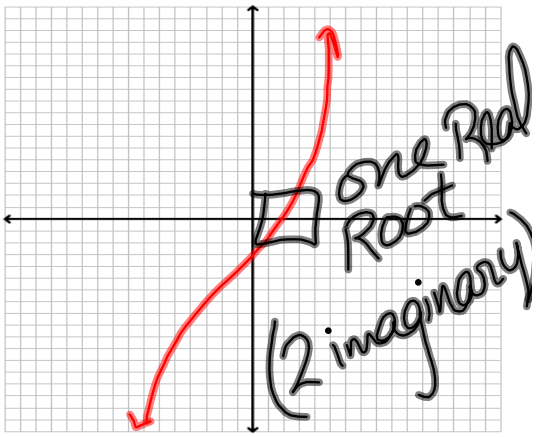
Ex. #3:

How many negative solutions to the equation $2x^3-4x^2+3x-1=0$ exist?

degree: 3 (3 Roots)



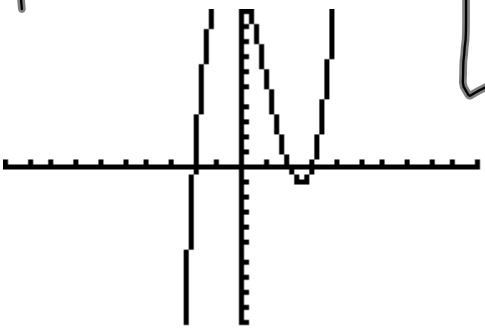
Zero Real



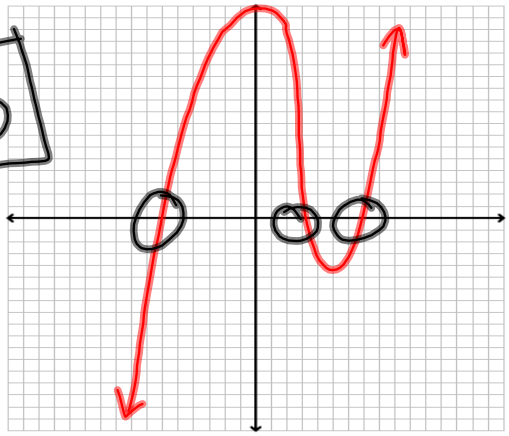
Ex. #4:

Determine how many solutions the function

$f(x) = x^3 - 3x^2 - 4x + 12$ has.



3



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Ex. #5:

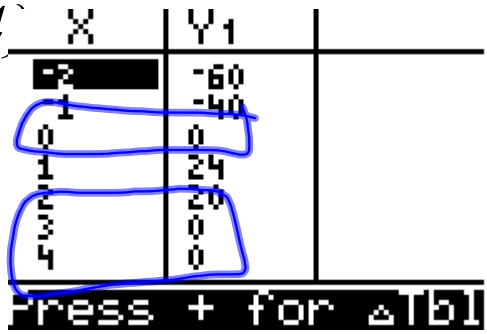
Using any method of your choice, determine the zeros for $f(x) = x^4 - 4x^3 - 9x^2 + 36x$ are:

1) {0, -3, 3, 4}

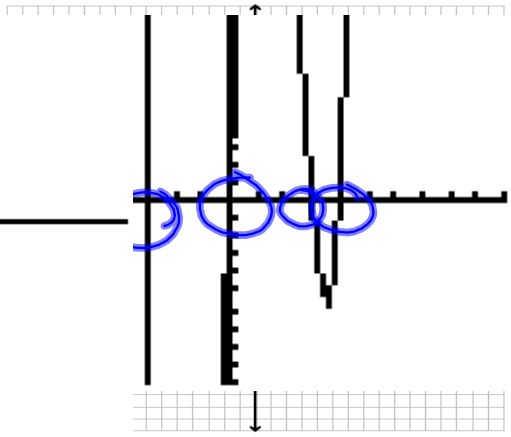
2) {0, 3, 4}

3) {0, -3, 3, -4}

4) {0, 3, -4}



The use of this grid is optional



Solve each of the following algebraically.

1) Which values of x are solutions of the equation $x^3 + x^2 - 2x$?

$x^3+x^2-2x=0$

$x(x^2+x-2)=0$ $\{0,-2,1\}$

$x=0$ $x^2+x-2=0$

Don't forget the steps of factoring:
1) GCF
2) Perfect Squares
3) Trinomial

2) $3x^5 - 48x = 0$

$3x(x^4-16)=0$ $(x+2)(x-1)=0$

$\frac{3x}{3}=\frac{0}{3}$ $x^4-16=0$ $x+2=0$ $x-1=0$

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

3) $2x^3 + 2x^2 - 4x = 0$

$x^2+4=0$ $x^2-4=0$

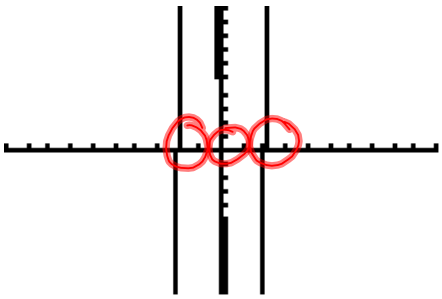
$\sqrt{x^2}=\sqrt{-4}$ $(x+2)(x-2)=0$ $\{0,\pm 2,\pm 2$

$x=\pm 2i$ $x=\pm 2$

4) $x^5 - x^4 - 2x^3 = 0$

$x^5-x^4-2x^3=0$

$x^3(x^2-x-2)=0$



$\sqrt[3]{x^3}=\sqrt[3]{0}$ $x^2-x-2=0$

$x\cdot x\cdot x=0$ $(x-2)(x+1)=0$

$x=0$ $x=\frac{1\pm\sqrt{1+8}}{2}$ $\{0,2,-1$

$=\frac{1\pm 3}{2}$

$\frac{1}{2}+\frac{3}{2}$ $\frac{1}{2}-\frac{3}{2}$

$\frac{4}{2}$ $-\frac{2}{2}$

Homework: p. 227 #3-5

(solve either algebraically or graphically)

Developing Skills

In 3–18, find all roots of each given function

3. $f(x) = x^3 + 7x^2 + 10x$

4. $f(x) = 2x^3 + 2x^2 - 4x$

5. $f(x) = x^3 + 3x^2 + 4x + 12$