Warm-up

2) Using the function, $f(x)=\begin{cases}3x, & x>4\\ x^2, & x\le 4\end{cases}$, evaluate $\frac{1}{2}f(-2)+f(4)-3f(6)$.

Find all roots.

1) $2x^3-8x^2+18x-20$

Objective: SWBAT write equations from roots and solve systems of equations with technology.

Agenda:

Warm up

Notes - equations from roots

Practice

Notes - systems of equations

Practice

Finding equations from roots:

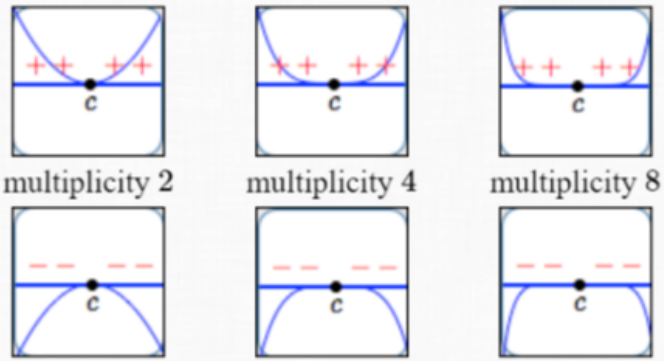
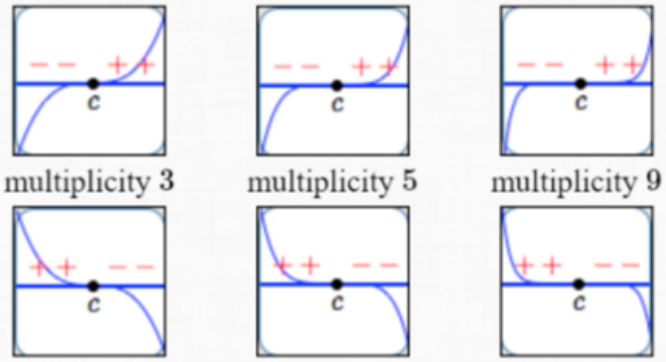
Graph these two equations:

$y = x^2 + x - 6$

$y = x^4 + 2x^3 - 11x^2 - 12x + 36$

What do you notice about these graphs?

Multiplicity of Zeroes: Graphical Consequences

multiplicity of zero	sign change at zero?	horizontal tangent line at zero?	flattening behavior at zero	sample graphs
multiplicity 1 : a simple zero	YES	NO	no flattening; graph cuts straight through	
EVEN multiplicities 2, 4, 6, . . .	NO	YES	more flattening as multiplicity increases	 multiplicity 2 multiplicity 4 multiplicity 8
ODD multiplicities 3, 5, 7, . . .	YES	YES	more flattening as multiplicity increases	 multiplicity 3 multiplicity 5 multiplicity 9

Least degree: a polynomial that has the indicated roots, but is of lowest degree possible (no multiplicity).

Writing a polynomial of least degree from roots:

Steps: 1. put roots into factor form

2. multiply the factors

Example: $x = 2, x = -1, x = 5$

Example: $x = 0,\ x = \frac{2}{3},\ x = -\frac{3}{5}$

Imaginary roots:

Imaginary roots come in pairs
(if it has 1, it will have 2)

These roots are always conjugates of each other:

3i and -3i **1+ 2i and 1 - 2i**

Find the polynomial of least degree with the roots:

2 and 4i

You try:

1. $x = -1,\ x = 4,\ x = -2$

2. $x = 6,\ x = \frac{2}{5},\ x = -\frac{3}{2}$

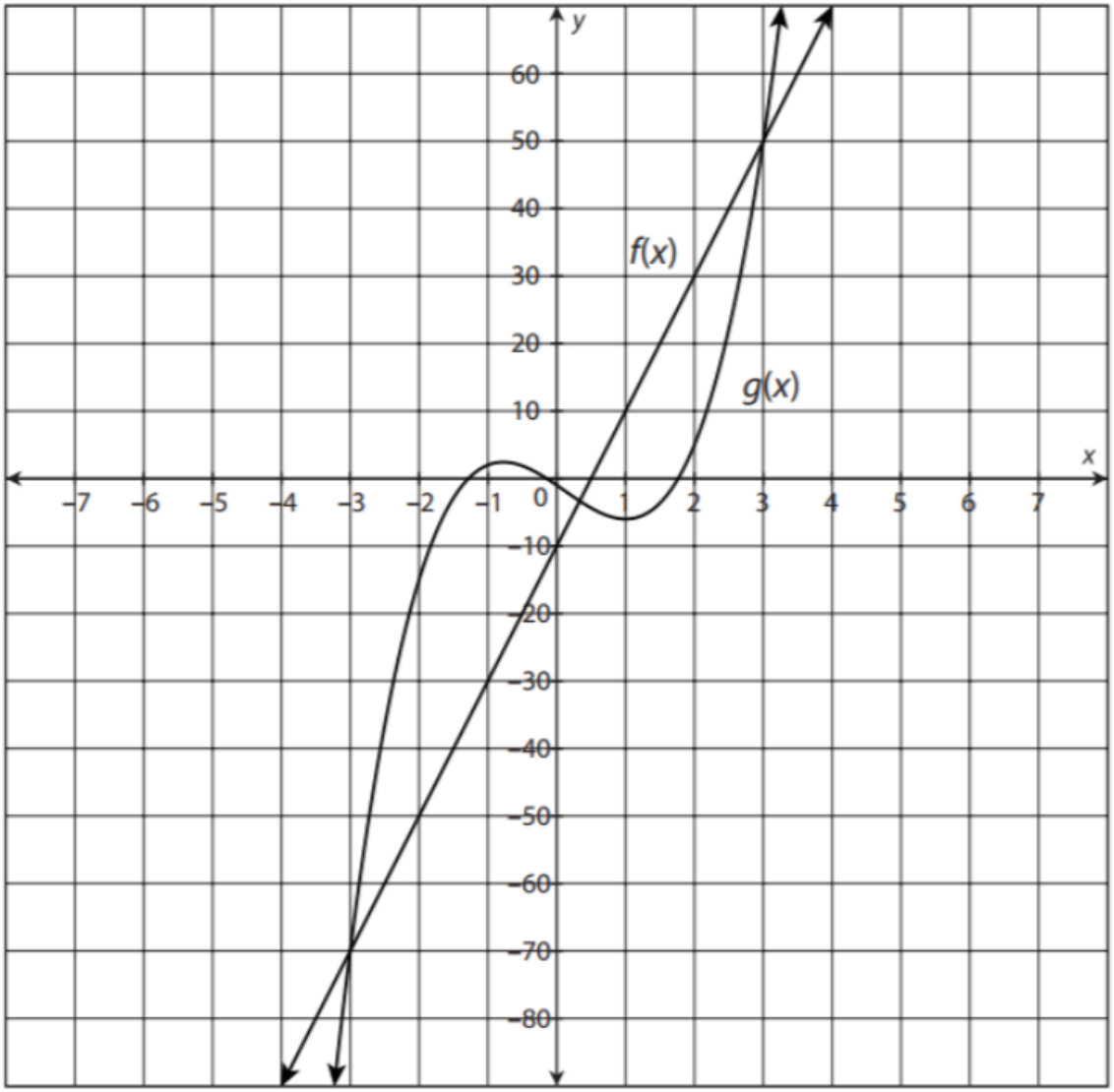
3. $x = 3,\ x = -2i$

Systems of equations - set of equations with the same unknowns

Solution(s) to systems of equations - the intersection(s) of the given equations otherwise stated at where f(x)=g(x)

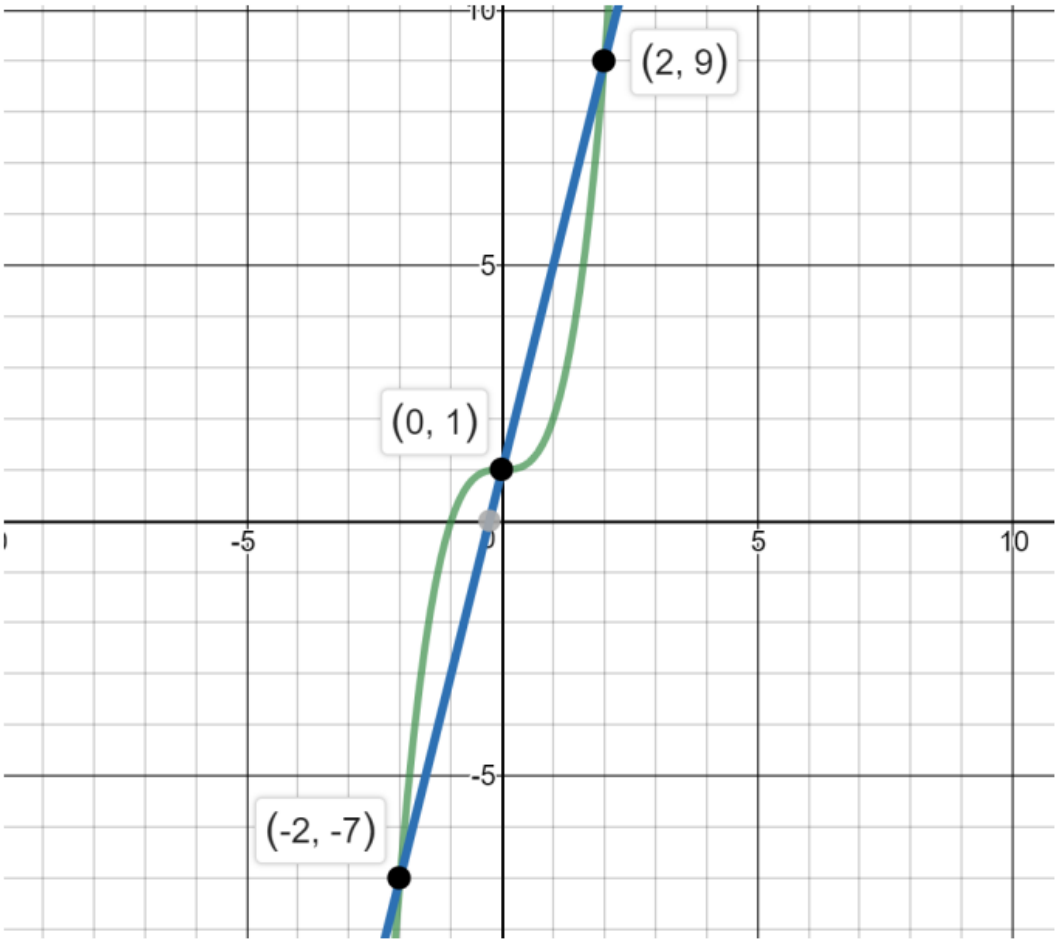
Example 1

Use the graph to estimate the solution(s), if any, to the system of equations. **Where is g(x)<f(x)?**



Example 2

Use a graph to estimate the real solution(s), if any, to the system of equations $\begin{cases} f(x)=4x+1 \\ g(x)=x^3+1 \end{cases}$.



$f(x)=|x+4|+1$

$g(x)=x^4+3x^3+1$

Given f(x) and g(x), where is f(x)>g(x)?