

Questions on 3.7 HW?

Look over pgs.32-33 and finish
those questions up.

SM3H-Module 3 SE.pdf - Adobe Acrobat Reader DC

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For each, one factor of a cubic function is given. Do your best to find the remaining factors and then use this information to determine all roots of the function and sketch a graph. $-12 \div 3 = -4$

4. Function: $f(x) = x^3 + 3x^2 - 4x - 12$ Factor: $(x + 3)$ Roots of function: $2, -2$
 $(x+3)(x+2)(x-2)$ $x = -3, -2, 2$ $-4 \cdot 1$
 $4 \cdot -1$

5. Function: $f(x) = x^3 + 6x^2 + 11x + 6$ Factor: $(x + 1)$ Roots of function:

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Polynomial Functions 32

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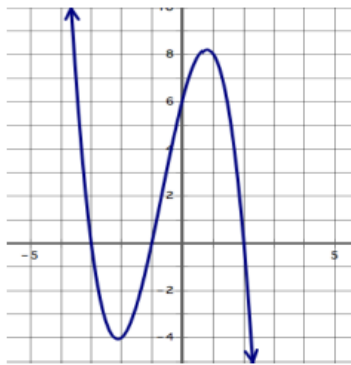
6. Function: $f(x) = x^3 + 3x^2 - 12x - 12$ Factor: $(x - 3)$ Roots of function:

3.7 Graphing all Poly's

A Solidify Understanding Task

Part I: Connecting the number system to polynomials.

1. Write everything you know about the following polynomial:



<http://www.flickr.com/photos/cu2nite/34778886>

2. In case this was not part of what you wrote in question 1, use function notation to highlight values of importance for this function. (For example: $f(0) = 6$)

3. The graph above gives us quite a bit of information to assist in writing the equation. What if instead you have a polynomial function written out in standard form and are given one factor, how could you determine the graph of the function?

$$ax^2 + bx + c \quad (x \quad)(x \quad)$$

$a=1$

For each, one factor of a cubic function is given. Do your best to find the remaining factors and then use this information to determine all roots of the function and sketch a graph.

4. Function: $f(x) = x^3 + 3x^2 - 4x - 12$ Factor: $(x + 3)$

$$= (x+3)(x+2)(x-2)$$

$$(x^2 + 2x + 3x + 6)(x-2)$$

$$(x^2 + 5x + 6)(x-2)$$

$$x^3 - 2x^2 + 5x^2 - 10x + 6x - 12$$

$$x^3 + 3x^2 - 4x - 12$$

Roots of function:

$$x = -3, -2, 2$$

● mult. to x term

● mult. to leading term (with the highest power of x)

5. Function: $f(x) = x^3 + 6x^2 + 11x + 6$ Factor: $(x + 1)$

$$= (x+1)(x+2)(x+3)$$

$6 \div 1 = 6$ Roots of function: $x = -1, -2, -3$

$$2, 3$$

$$-2, -3$$

$$6, 1$$

$$-6, -1$$

7. Function: $f(x) = x^3 - x^2 + 4x - 4$ Factor: $(x - 2i)$ Roots of function:
 $(x - 2i)(x + 2i)(x - 1)$ $x = 2i, -2i, 1$

$-2i \cdot 2i = -4 \cdot i^2 = -4 \cdot -1 = 4$

8. Function: $f(x) = x^3 - 3x^2 - 3x - 9$ Factor: $(x - 3)$ Roots of function:

9. Find all linear factors and graph: $f(x) = x^4 - 16$ Roots of function:
 $(x^2 - 4)(x^2 + 4) =$ $x^2 + 4 = 0$ $x = -2, 2, -2i, 2i$
 $(x + 2)(x - 2)(x^2 + 4) =$ $\sqrt{x^2 = -4}$ $x = \pm 2i$
 $(x + 2)(x - 2)(x + 2i)(x - 2i)$ $\sqrt{-4} = \sqrt{-1 \cdot 4}$
 $= i \cdot 2$

Part II: Given the roots, find the factors and write the polynomial equation in standard form.

10. Roots: 3, 4, and 0
 $x(x - 3)(x + 4) = (x^2 - 3x)(x + 4)$
 $= x^3 + 4x^2 - 3x^2 - 12x$
 $= x^3 + x^2 - 12x$

11. Roots: 5, $2i$, $-2i$
 $(x - 5)(x - 2i)(x + 2i) = (x^2 - 2ix - 5x + 10i)(x + 2i)$
 $(x - 2i)(x + 2i) = x^2 + 2ix - 2ix - 4i^2 = x^2 + 4$
 $(x^2 + 4)(x - 5) = x^3 - 5x^2 + 4x - 20$
 $x^3 + 4x - 5x^2 - 20$
 $x^3 - 5x^2 + 4x - 20$

12. Roots: $\sqrt{3}, -\sqrt{3}, -2$
 $(x - \sqrt{3})(x + \sqrt{3})(x + 2) =$
 $(x^2 + x\sqrt{3} - x\sqrt{3} - 3)(x + 2)$
 $(x^2 - 3)(x + 2)$
 $x^3 + 2x^2 - 3x - 6$

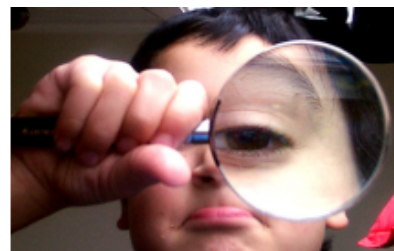
13. Find the factored form of the cubic function with roots 2, $3i$ and $-3i$
 $(x - 2)(x + 3i)(x - 3i)$
 $(x - 2)(x^2 - 3ix + 3ix - 9i^2)$
 $(x - 2)(x^2 + 9)$
 $x^3 + 9x - 2x^2 - 18$
 $x^3 - 2x^2 + 9x - 18$

14. Conclusion: What have you learned about polynomial functions as a result of this task?

3.8 I Know, What do you know?

A Practice Understanding Task

Use the information provided to graph and write out the polynomial function in factored form.

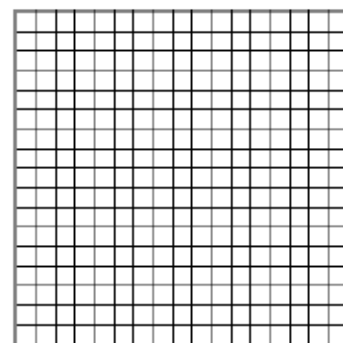
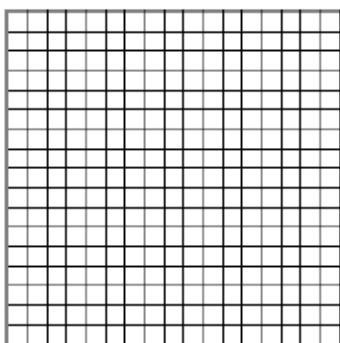


<http://www.flickr.com/photos/chrisbrenc>

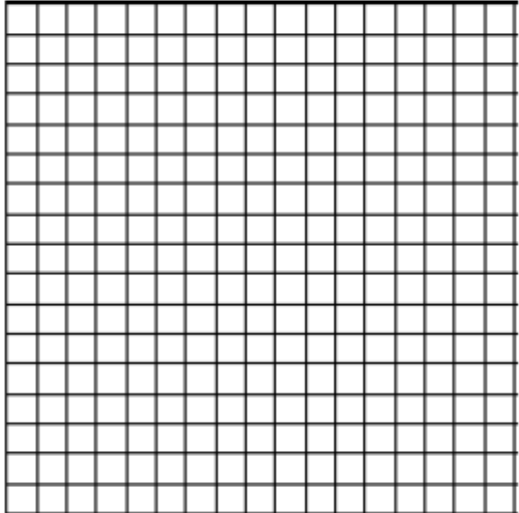
$\pm 2i$
 $2+i, 2-i$

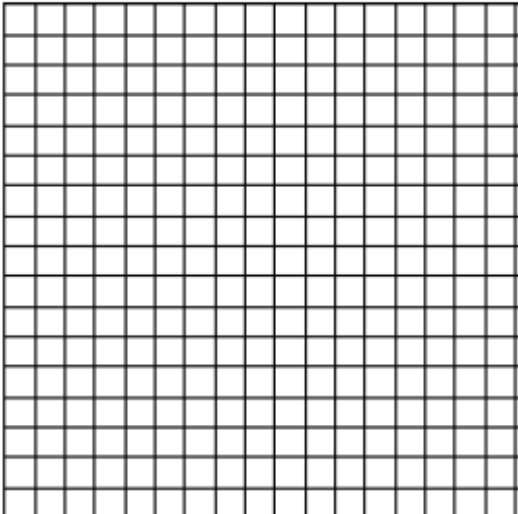
	Degree of poly	Given roots (you may have to determine others):	Leading coefficient	Equation (in factored and standard form):
1	3	-2, 1, and 1	-2	
2	4	$2 + i, 4, 0$	1	
3	2	$\sqrt{2}$	-1	

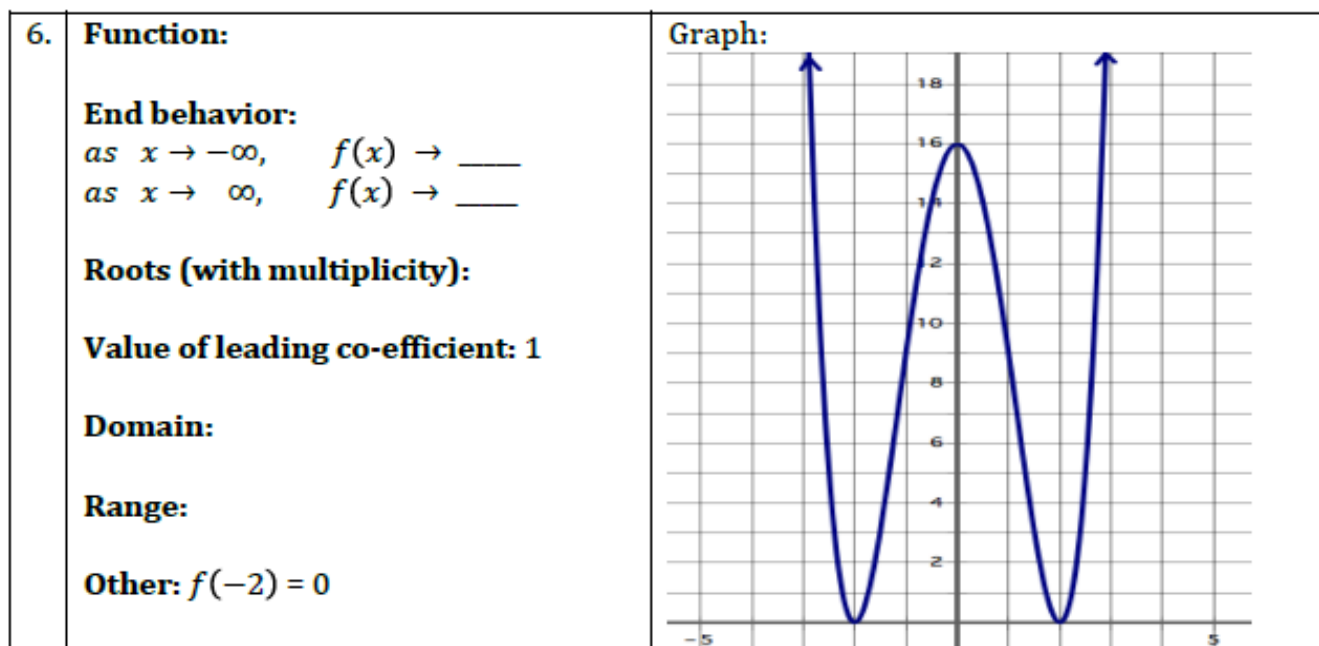
$-2(x+2)(x-1)^2$
 $x(x-4)(x+(2+i))(x+(2-i))$
 $-1(x-\sqrt{2})(x+\sqrt{2})$



If I know... What do you know? For each problem, what I know about a function is given... your job is to complete the table of information with what you know.

<p>4. Function: $f(x) = 2(x - 1)(x + 3)^2$</p> <p>End behavior: as $x \rightarrow -\infty$, $f(x) \rightarrow \underline{\hspace{2cm}}$ as $x \rightarrow \infty$, $f(x) \rightarrow \underline{\hspace{2cm}}$</p> <p>Roots (with multiplicity):</p> <p>Value of leading co-efficient:</p> <p>Domain:</p> <p>Range: All Real numbers</p>	<p>Graph:</p> 
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<p>5. Function:</p> <p>End behavior: as $x \rightarrow -\infty$, $f(x) \rightarrow \infty$ as $x \rightarrow \infty$, $f(x) \rightarrow \underline{\hspace{2cm}}$</p> <p>Roots (with multiplicity): (3,0) m: 1; (-1,0) m: 2 (0,0) m: 2</p> <p>Value of leading co-efficient: -1</p> <p>Domain:</p> <p>Range:</p>	<p>Graph:</p> 
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Without using technology, sketch the graph of the polynomial function described. The term “imaginary roots” means complex zeros.

7. A cubic function with a leading coefficient of -2, with two negative zeros and one positive.

8. A quartic function with a leading coefficient of 1, with two negative zeros and one positive double zero.

9. A cubic function with a leading coefficient of -3, with an imaginary root and one positive double root.

10. A quartic function with a leading coefficient of -2, with two negative zeros and one positive double root.

Find all factors and sketch the graph of the polynomial functions.

11. $f(x) = x^3 - x^2$

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

13. $f(x) = x^3 - 2x$

14. $f(x) = x^3 - x^2 + 9x - 9$

Homework

3.7 "Ready, Set, Go"