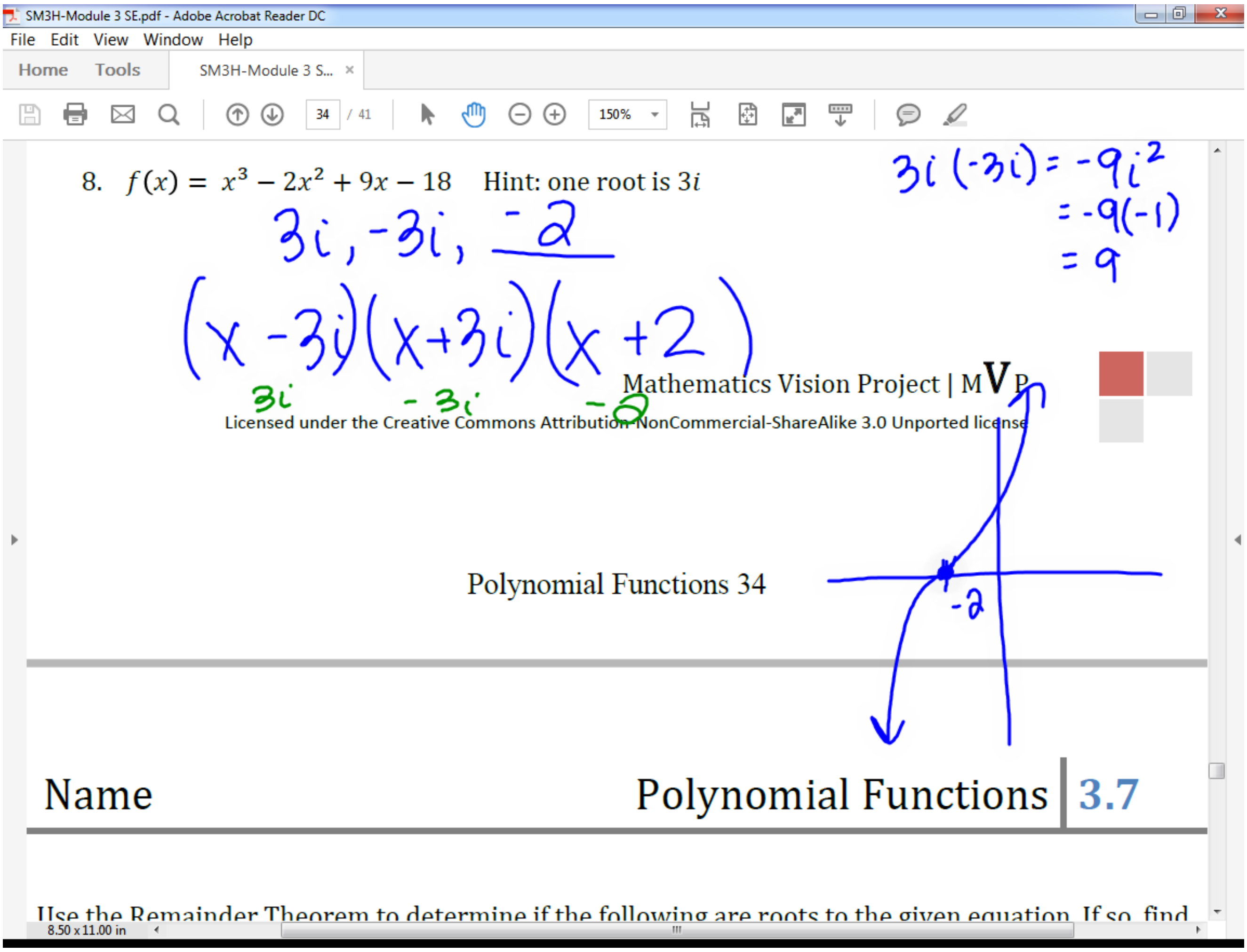
Questions on 3.7 and 3.8 HW?



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8. $f(x) = x^3 - 2x^2 + 9x - 18$ Hint: one root is $3i$

$3i, -3i, \underline{-2}$

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

$3i \quad -3i \quad -2$

$3i(-3i) = -9i^2$

$= -9(-1)$

$= 9$

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Polynomial Functions 34

Name Polynomial Functions 3.7

Use the Remainder Theorem to determine if the following are roots to the given equation. If so, find

8.50 x 11.00 in

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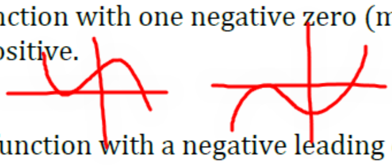
Without using technology, sketch the graph of the polynomial function described.

http://www.flickr.com/photos/cu2nite/3

1. A cubic function with one negative zero (multiplicity 2) and one positive.



2. A quartic function with a negative leading coefficient, a positive y-intercept, one negative double root, one positive zero, and one zero at the origin.

3. A cubic function with zero real roots.

4. A quartic function with zero real roots, a positive leading coefficient, and a positive y-intercept.

Set

Topic: Finding factors of polynomial functions

Find all linear factors and sketch the graph of the polynomial functions (unless you see another method that allows for quicker graphing. If so, explain method).

8.50 x 11.00 in

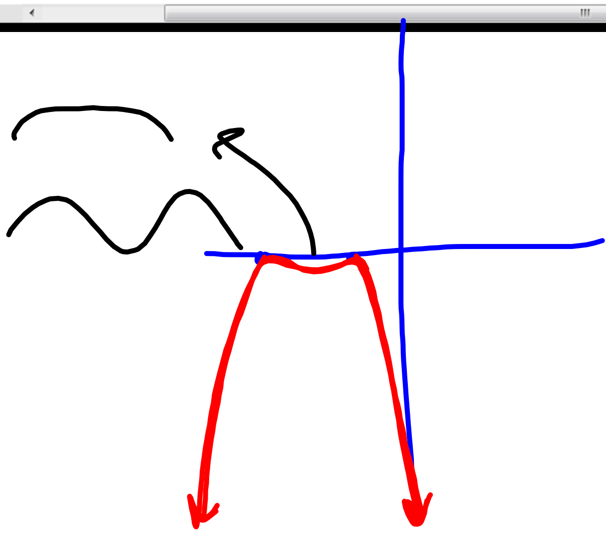
10. A cubic function with a leading coefficient of -2, with one positive zero.

11. A quartic function with a leading coefficient of 1, with two double zeros.

12. A cubic function with a leading coefficient of -3, with one positive triple root.

$(x-2)^3$

13. A quartic function with a leading coefficient of -2, with two negative zeros and two complex roots.



Practice Problems. These will be checked off today for points.

1. $(3x^3 - 15x^2 - 13x - 25) \div (x - 6)$
2. $(6p^3 - 7p^2 + 5) \div (6p - 7)$
3. $(2x^3 - x^2 - 8) \div (2x - 1)$
4. $(8a^3 + 7a^2 - 15a + 3) \div (a + 2)$
5. $(9n^3 + 10n^2 + 6) \div (9n + 10)$
6. $(v^3 - 4v^2 - 29v - 19) \div (v - 8)$

Rational Root Theorem:

$$a_n x^n + a_{n-1}x^{n-1} + \cdots + a_0 = 0$$

→ any polynomial

-Possible rational roots are p/q, where p is an integer factor of the constant term (a_0) and q is an integer factor of the leading coefficient (a_n).

Practice

State the possible rational zeros for each function. Then find all rational zeros.

$f(x) = 9x^3 - 6x^2 + 34x - 11$

p = -11 → 11, 1

q = 9 → 1, 3, 9

$\frac{p}{q} \to \pm\left\{\frac{11}{1}, \frac{11}{3}, \frac{11}{9}, \frac{1}{1}, \frac{1}{3}, \frac{1}{9}\right\}$

$\frac{p}{q} \to \pm\left\{11, 1, \frac{11}{3}, \frac{11}{9}, \frac{1}{3}, \frac{1}{9}\right\}$

$f(x) = 2x^3 - x^2 - 2x + 1$

p = 1 → 1

q = 2 → 1, 2

$\frac{p}{q} \to \pm\left\{1, \frac{1}{2}\right\}$

$f(x) = x^3 - 5x^2 - 15x + 27$

p = 27 → 1, 3, 9, 27

q = 1 → 1

$\frac{p}{q} \to \pm\{1, 3, 9, 27\}$

$f(x) = 2x^3 - 5x^2 + 4x - 1$

p = 1

q = 1, 2

$\frac{p}{q} \to \pm\left\{1, \frac{1}{2}\right\}$

Root: 1

Factor: (x-1)

$$\begin{array}{r} 2x^2 - 3x + 1 \\ x-1 \overline{) 2x^3 - 5x^2 + 4x - 1} \\ -(2x^3 - 2x^2) \\ \hline -3x^2 + 4x \\ -(-3x^2 + 3x) \\ \hline x - 1 \\ -(x - 1) \\ \hline 0 \end{array}$$

$3\overline{)6}$ → 2

$2x^3 - 5x^2 + 4x - 1 = (x-1)(2x^2 - 3x + 1)$

$= (x-1)(x-1)(2x-1)$

$\frac{-1}{x} \leftarrow \frac{-2}{2x}$, $\frac{-1}{2x}$ (2, -3)

Binomial Theorem

According to the theorem, it is possible to expand any power of $x + y$ into a sum of the form

$$(x+y)^n = \binom{n}{0}x^n y^0 + \binom{n}{1}x^{n-1}y^1 + \binom{n}{2}x^{n-2}y^2 + \cdots + \binom{n}{n-1}x^1 y^{n-1} + \binom{n}{n}x^0 y^n,$$

where each $\binom{n}{k}$ is a specific positive integer known as a binomial coefficient.

We determine each binomial coefficient by using Pascal's triangle.

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1

1) 3rd term in expansion of $(m - n^2)^4$

2) 5th term in expansion of $(3 + y)^4$

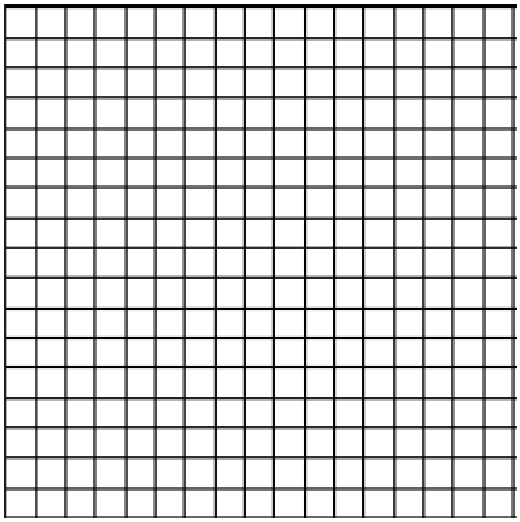
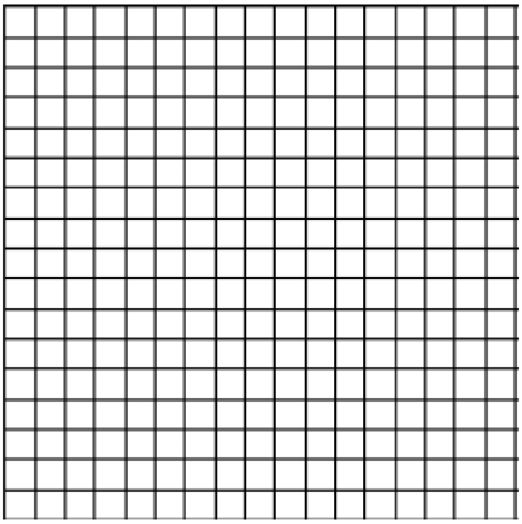
3) 3rd term in expansion of $(y + 4)^4$

4) 3rd term in expansion of $(2x^2 + 1)^4$

Homework

Polynomial Extra WKS

From 3.8...turn to page 37

4.	**Function:** $f(x) = 2(x-1)(x+3)^2$ **End behavior:** $as \quad x \to -\infty, \qquad f(x) \to$ ____ $as \quad x \to \ \infty, \qquad f(x) \to$ ____ **Roots (with multiplicity):** **Value of leading co-efficient:** **Domain:** **Range:** All Real numbers	Graph: 
5.	**Function:** **End behavior:** $as \quad x \to -\infty, \qquad f(x) \to \infty$ $as \quad x \to \ \infty, \qquad f(x) \to$ ____ **Roots (with multiplicity):** (3,0) m: 1; (-1,0) m: 2 (0,0) m: 2 **Value of leading co-efficient:** -1 **Domain:** **Range:**	Graph: 

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<tr>
<td>6.</td>
<td>Function:

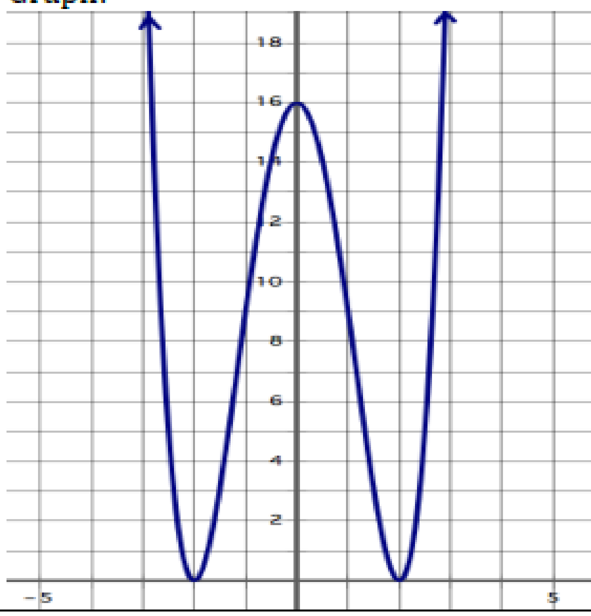
End behavior:
$as\ \ x \to -\infty, \quad f(x) \to$ ____
$as\ \ x \to \ \infty, \quad f(x) \to$ ____

Roots (with multiplicity):

Value of leading co-efficient: 1

Domain:

Range:

Other: $f(-2) = 0$</td>
<td>Graph:

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

Nov 7-1:35 PM