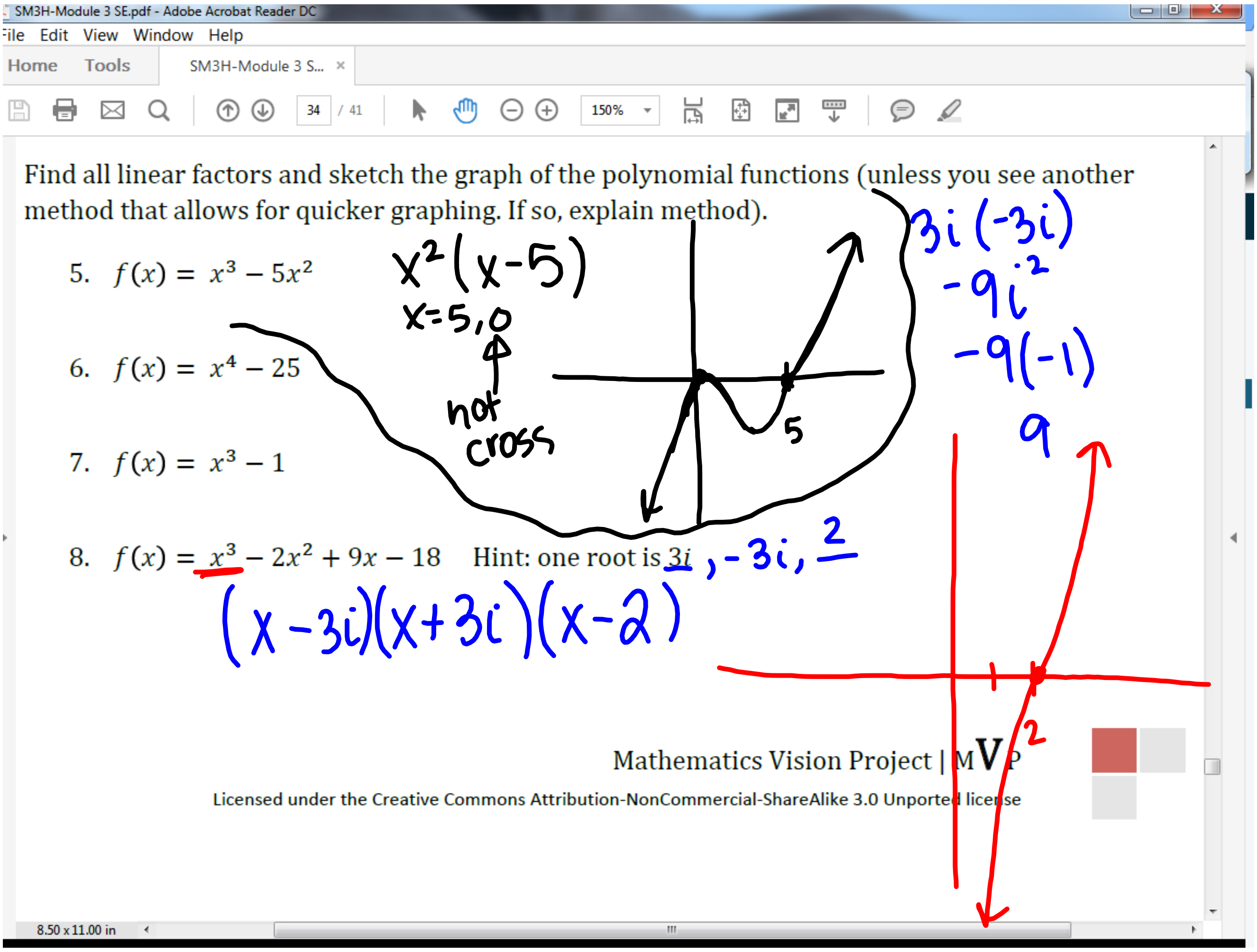
Questions on 3.7 and 3.8 HW?

Mar 28-10:17 AM



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).

5. $f(x) = x^3 - 5x^2$

$x^2(x-5)$

$x = 5, 0$

not cross

5

6. $f(x) = x^4 - 25$

7. $f(x) = x^3 - 1$

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

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

$3i(-3i)$

$-9i^2$

$-9(-1)$

9

2

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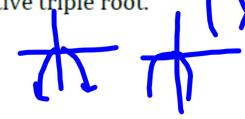
Without using technology, sketch the graph of the polynomial function described. The term "imaginary roots" means complex zeros.

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. $(\quad)^2(\quad)^2$

12. A cubic function with a leading coefficient of -3, with one positive triple root. $(x\quad)^3$



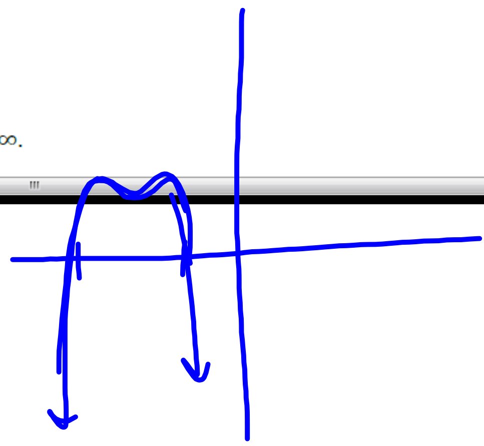
13. A quartic function with a leading coefficient of -2, with two negative zeros and two complex roots. $-2(x+1)(x+3)(x+2i)(x-2i)$

Go

Topic: end behavior

Circle the expression that has the greatest value of $f(x)$ as $x \to \infty$.

8.50 x 11.00 in



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:

$$\overset{q}{a_n}x^n + a_{n-1}x^{n-1} + \cdots + \overset{p}{a_0} = 0 \rightarrow \text{any polynomial}$$

-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.

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

$p = 11 \rightarrow 1, 11$

$q = 9 \rightarrow 1, 3, 9$

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

$f(x) = \overset{q}{2}x^3 - x^2 - 2x + \overset{p}{1}$

$p = 1 \rightarrow 1$

$q = 2 \rightarrow 1, 2$ $\quad \frac{p}{q} \rightarrow \pm\left\{\frac{1}{1}, \frac{1}{2}\right\}$

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

$p: 27 \rightarrow 1, 3, 9, 27$

$q: 1 \rightarrow 1$

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

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

$p: 1 \rightarrow 1$

$q: 2 \rightarrow 1, 2$ $\quad \frac{p}{q}: \pm\left\{1, \frac{1}{2}\right\}$

15 $\quad x^3 - 3x - 2$

$p: 2 \rightarrow 1, 2$

$q: 1 \rightarrow 1$

$\frac{p}{q}: \pm\{1, 2\}$

Roots: $-1, 2$

$(x+1), (x-2)$

$$\begin{array}{r|l} & x^2 - x - 2 \\ \hline x+1 & x^3 + 0x^2 - 3x - 2 \\ & -(x^3 + x^2) \\ \hline & -x^2 - 3x \\ & -(-x^2 - x) \\ \hline & -2x - 2 \\ & -(-2x - 2) \\ \hline & 0 \end{array}$$

So what that means is....

$x^3 - 3x - 2 =$

$(x+1)(x^2 - x - 2)$

AND...

$(x+1)(x-2)(x+1)$

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.

$$\begin{array}{ccccccccccccccc}
&&&&&&&1&&&&&&& \\
&&&&&&1&&1&&&&&& \\
&&&&&1&&2&&1&&&&& \\
&&&&1&&3&&3&&1&&&& \\
&&&1&&4&&6&&4&&1&&& \\
&&1&&5&&10&&10&&5&&1&& \\
&1&&6&&15&&20&&15&&6&&1& \\
1&&7&&21&&35&&35&&21&&7&&1
\end{array}$$

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

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

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

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

Nov 14-9:29 AM

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:**

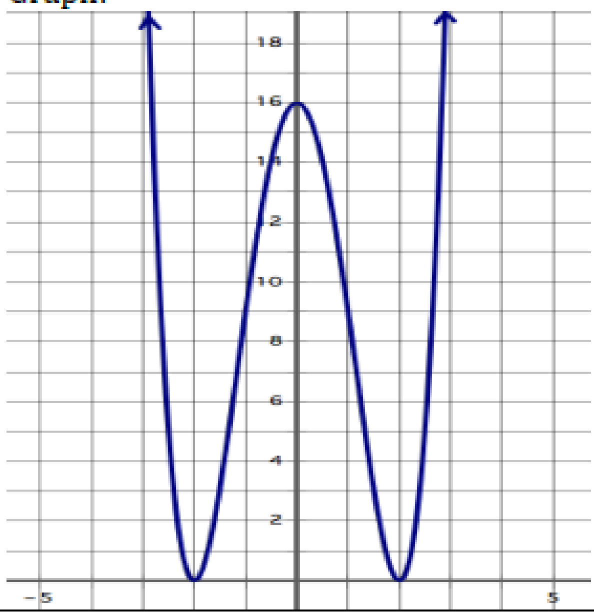
End behavior:
$as \quad x \to -\infty, \qquad f(x) \to \infty$
$as \quad x \to \ \ \infty, \qquad f(x) \to$ ____

Roots (with multiplicity):
(3,0) m: 1;
(-1,0) m: 2
(0,0) m: 2
Value of leading co-efficient: -1

Domain:

Range:

Graph:

6.	**Function:** **End behavior:** *as* $x \to -\infty$, $f(x) \to$ ____ *as* $x \to \infty$, $f(x) \to$ ____ **Roots (with multiplicity):** **Value of leading co-efficient:** 1 **Domain:** **Range:** **Other:** $f(-2) = 0$	Graph: 

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