Questions on 3.7 and 3.8 HW?

Remainder Theorem (pg.35):

$f(a)$, a is root

$x - a$

$f(a) = 0$, then a is a root of our polynomial.

(9) $f(x) = x^3 + 5x^2 + 2x - 8$; $f(1)$

$f(1) = (1)^3 + 5(1)^2 + 2(1) - 8 = 1 + 5 + 2 - 8 = \underline{\underline{0}}$

Yes, 1 is a root.

$(x-1)$ is a factor.

Mar 28-10:17 AM

Polynomial Division

Just like with whole numbers, we can divide polynomials too!

Practice.

484/4

$$4\overline{)484} = 121$$
-4, 08, -8, 04, -4, 0

$$(3k^4 + 40k^3 + 5k^2) \div 10k^2$$

$\frac{3}{10}k^2 + 4k + \frac{1}{2}$

$10k^2\overline{)3k^4 + 40k^3 + 5k^2 + 0k + 0}$

$\frac{3k^4}{10k^2} = \frac{3}{10}k^2$

$-(3k^4)$, $0 + 40k^3$, $-(40k^3)$, $0 + 5k^2$, $-(5k^2)$, 0

Answer: $\frac{3}{10}k^2 + 4k + \frac{1}{2}$

$$(m^3 + m^2 - 28m - 19) \div (m - 5)$$

$m^2 + 6m + 2$

$m-5\overline{)m^3 + m^2 - 28m - 19}$

$-(m^3 - 5m^2)$ $\quad 1m^2 - -5m^2$

$0m^3 + 6m^2 - 28m$

$\frac{6m^2}{m} = 6m$

$-(6m^2 - 30m)$

$2m - 19$

$-(2m - 10)$

-9

Answer: $m^2 + 6m + 2 - \frac{9}{m-5}$

$\frac{3}{2} \rightarrow 2\overline{)3.0} = 1\frac{1}{2}$, -2, 1

Practice.

$$(x^3 - x^2 - 32x + 62) \div (x + 6)$$

$$\begin{array}{r} x^2 - 7x + 10 \\ x+6 \overline{) x^3 - x^2 - 32x + 62} \\ -(x^3 + 6x^2) \\ \hline -7x^2 - 32x \\ -(-7x^2 - 42x) \\ \hline 10x + 62 \\ -(10x + 60) \\ \hline 2 \end{array}$$

$-x^2 + -6x^2$

Answer: $x^2 - 7x + 10 + \frac{2}{x+6}$

$$(b^3 - 5b^2 - 8) \div (b - 5)$$

$$\begin{array}{r} b^2 \\ b-5 \overline{) b^3 - 5b^2 + 0b - 8} \\ -(b^3 - 5b^2) \\ \hline 0b^2 + 0b - 8 \end{array}$$

Answer: $b^2 - \frac{8}{b-5}$

OR $b^2 + 0b - \frac{8}{b-5}$

$$(3n^3 - 14n^2 - 45n - 37) \div (3n + 4)$$

$$\begin{array}{r} n^2 - 6n - 7 \\ 3n+4 \overline{) 3n^3 - 14n^2 - 45n - 37} \\ -(3n^3 + 4n^2) \\ \hline -18n^2 - 45n \\ -(-18n^2 - 24n) \\ \hline -21n - 37 \\ -(-21n - 28) \\ \hline -9 \end{array}$$

$-14 + -4$

$-45 + 24$

Answer: $n^2 - 6n - 7 - \frac{9}{3n+4}$

Practice.

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:

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

-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.

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

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

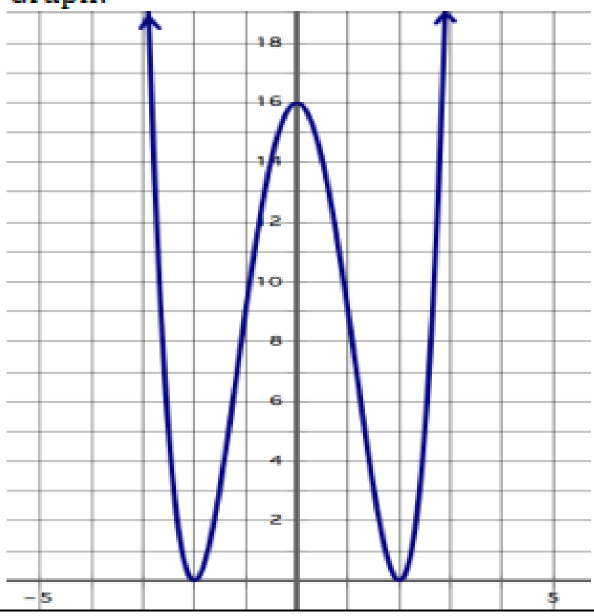
$$f(x) = x^3 - 5x^2 - 15x + 27$$

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

From 3.8...turn to page 37

4.	**Function:** $f(x) = 2(x-1)(x+3)^2$ **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:** **Domain:** **Range:** All Real numbers	Graph:

5.	**Function:** **End behavior:** $as\ \ x \to -\infty, \quad f(x) \to \infty$ $as\ \ x \to \ \infty, \quad f(x) \to$ ____ **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:** $as\ \ x \to -\infty, \quad f(x) \to$ ____ $as\ \ x \to \ \infty, \quad f(x) \to$ ____ **Roots (with multiplicity):** **Value of leading co-efficient:** 1 **Domain:** **Range:** **Other:** $f(-2) = 0$	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. $f(x) = x^3 - x^2 + 9x - 9$