Name: _____

Date: _____

Chapter 3 Study Guide

In Problem 1, you are given an equation and the graph of a quadratic function. Do each of the following.
(a) Write f(x) in vertex form   .   *(b) Give the domain and range.*
(c) Give the coordinates of the vertex.   *(d) Give the equation of the axis.*
(e) Find the y-intercepts.   *(f) Find the x-intercepts.*

1) $f(x) = x^2 - 10x + 21$

Use synthetic division to perform each division. Express the result *in the form* $f(x) = q(x) + \frac{r}{(x-k)}$.
If $r = 0,$ *then* $f(x) = q(x)$ *is sufficient. Show all work for credit.*

2) $\dfrac{x^6 - 3x^4 + 2x^3 - 6x^2 - 5x + 3}{x+2}$ = _____

.

3) $\dfrac{x^5 + 1}{x+1}$ = _____

Express $f(x)$ in the form $f(x) = (x - k)q(x) + r$ for the given value of k.

4) $f(x) = 3x^4 + 4x^3 - 10x^2 + 15;\quad k = -1$

For the polynomial function, use the remainder theorem and synthetic division to find $f(k)$.

5) $f(x) = x^2 - x + 3;\quad k = 3 - 2i$

Use synthetic division to decide whether the given number k is a zero of the given polynomial function. If it is not, give the value of $f(k)$.

6) $f(x) = 16x^4 + 4x^2 - 2;\quad k = \dfrac{1}{2}$

Use the factor theorem and synthetic division to decide whether the second polynomial is a factor of the first.

7) $-3x^4 + x^3 - 5x^2 + 2x + 4;\ x - 1$

Factor $f(x)$ into linear factors given that k is a zero of $f(x)$.

8) $f(x) = 2x^3 - 3x^2 - 5x + 6;\ k = 1$ $f(x)$_____

For the polynomial function, one zero is given. Find all others.

9) $f(x) = 4x^3 + 6x^2 - 2x - 1;\ \dfrac{1}{2}$

Zeros:_____

*For the polynomial function (**a**) list all possible rational zeros, (**b**) find all rational zeros and (**c**) factor*
$f(x)$.

10) $f(x) = x^3 - x^2 - 10x - 8$

(**a**) Possible Zeros: _____

(**b**) Rational Zeros: _____

(**c**) $f(x) =$ _____

Find a polynomial function of degree 3 with real coefficients that satisfies the given conditions.

11) $Zeros\ of\ 2, -3\ and\ 5;\ \ f(3) = 6$

$f(x) =$ _____

12) Describe the end behavior of the graph of each polynomial function.

(a) $-4x^3 + 3x^2 - 1$

(b) $3 + 2x - 4x^2 - 5x^{10}$

13) Use the intermediate value theorem for polynomials to show that each polynomial function has a real zero between the numbers given.

(a) $2x^3 - 5x^2 - 5x + 7;\ \ 0\ and\ 1$

(b) $3x^2 - x - 4;\ \ 1\ and\ 2$

14) Show that the real zeros of each polynomial function satisfy the given condition

(a) $f(x) = x^4 - x^3 + 3x^2 - 8x + 8;\ \ no\ real\ zero\ greater\ than\ 2$

(b) $f(x) = x^4 + x^3 - x^2 + 3;\ \ no\ real\ zero\ less\ than - 2$

15) Find the Horizontal and Vertical Asymptotes of the following:

(a) $f(x) = \frac{x^2 - x}{x + 2}$

(b) $f(x) = \frac{5x}{x^2 - 1}$