Algebra II with Support
Unit 3 Polynomial Functions
Review

Name_____

1. List the possible rational zeros. (Do NOT Solve)
$(6x^3 + 2x^2 - 3x + 4)$ $\frac{1,2,4}{1,2,3,6} \rightarrow \pm\left(1, \frac{1}{2}, \frac{1}{3}, \frac{1}{6}, 2, \frac{2}{3}, 4, \frac{4}{3}\right)$

2. List the possible rational zeros. (Do NOT Solve)
$(x^3 + 5x^2 - 7x - 24)$ $\frac{1,2,3,4,6,8,12,24}{1} = \pm(1,2,3,4,6,8,12,24)$

3. Divide the polynomials using synthetic division.
$(3x^4 + 5x^3 + 4x^2 + 3x - 9) \div (x + 2)$

$-2 \mid 3\ 5\ 4\ 3\ -9$
$\quad -6\ 2\ -12\ 18$
$3\ -1\ 6\ -9\ \boxed{9}$

$3x^3 - x^2 + 6x - 9 + \frac{9}{x+2}$

4. Is $(x - 1)$ a factor of the function $f(x) = 4x^3 - 4x^2 - 9x + 9$? Use synthetic division to show why or why not?

$1 \mid 4\ -4\ -9\ 9$
$\quad 4\ 0\ -9$
$4\ 0\ -9\ 0$

Yes $x-1$ is a factor because there is no remainder.

5. If $(x+3)$ is a factor of $x^3 - x^2 - 17x - 15$, find the other <u>factors</u>.

$-3 \mid 1\ -1\ -17\ -15$
$\quad -3\ 12\ 15$
$1\ -4\ -5\ 0$

$x^2 - 4x - 5 = 0$
$(x-5)(x+1)$

6. If 2 is a zero of $f(x) = x^3 - 8x^2 + 5x + 14$, find the other <u>zeros</u>.

$2 \mid 1\ -8\ 5\ 14$
$\quad 2\ -12\ -14$
$1\ -6\ -7\ 0$

$x^2 - 6x - 7 = 0$
$(x-7)(x+1) = 0$
$x = 7 \quad x = -1$
$x = \{-1, 2, 7\}$

<u>#7-10: Find the zeros of the polynomial functions. (*Exact answers, no decimals*)</u>

7. $f(x) = x^3 + 3x^2 - 4x - 12$

$X = \{-3, -2, 2\}$

8. $g(x) = 2x^3 - 6x^2 - 6x + 18$

$3 \mid 2\ -6\ -6\ 18$
$\quad 6\ 0\ -18$
$2\ 0\ -6\ 0$

$2x^2 - 16 = 0$
$2x^2 = 16$
$x^2 = 8$
$X = \pm 2\sqrt{2}$

9. $j(x) = x^4 - 5x^3 + 8x^2 - 20x + 16$

1 | 1 -5 8 -20 16
1 -4 4 -16
1 -4 4 -16 0

4 | 1 -4 4 -16
4 0 16
1 0 4 0

$x^2+4=0$
$x^2=-4$
$x=\pm 2i$

$x=\{1, 4, \pm 2i\}$

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

-1 | 3 5 -2 -4
-3 -2 4
3 2 -4 0

$\frac{-2\pm\sqrt{2^2-4(3)(-4)}}{2(3)} = \frac{-2\pm\sqrt{52}}{6} = \frac{-1\pm\sqrt{13}}{3}$

$x=\{-1, \frac{-1\pm\sqrt{13}}{3}\}$

11. Given the following zeros of a function: $1+\sqrt{2}$, $2i$ what are the *missing* zeros? (Do Not Solve)

$1-\sqrt{2}$, $-2i$

12. Write a polynomial function with zeros -2, 5, and 3.

$(x+2)(x-5)(x-3)$
$(x^2-3x-10)(x-3)$

	x^2	$-3x$	-10
x	x^3	$-3x^2$	$-10x$
-3	$-3x^2$	$9x$	30

$f(x)=x^3-6x^2-x+30$

13. Write a polynomial function with zeros -4 and 3i.

$(x+3i)(x-3i)(x+4)$
$(x^2+3xi-3xi-9i^2)(x+4)$
$(x^2+9)(x+4)$

$(x^2+9)(x+4)$
$f(x)=x^3+4x^2+9x+36$

Factor completely.

14. $x^2 - 81$

$(x+9)(x-9)$

15. $x^3 + 8$

$(x+2)(x^2-2x+4)$

16. $x^3 - 5x^2 + 4x - 20$

	x	-5
x^2	x^3	$-5x^2$
4	$4x$	-20

$(x-5)(x^2-4)$
$(x-5)(x+2)(x-2)$

17. $6x^2 - x - 15$

-90
-10×9
-1

	$2x$	3
$3x$	$6x^2$	$9x$
-5	$-10x$	-15

$(2x+3)(3x-5)$