Name: Key Date: ________ Class: ______

Honors Pre-Calculus Unit 2 Test Review Sheet

1. Determine if the function is a polynomial. If it is, what is the degree and leading coefficient?

a. $f(x) = 5 - 6x + 3x^2$ b. $f(x) = 6x - 3 - 5x^{-2} + 1$ c. $f(x) = -10x^5 - 4x^3 + 6$

yes; D: 2, LC: 3 NO yes; D: 5; LC: −10

2. Find the degree and the leading coefficient

$f(x) = x^3(7-x)^2(4x+1)^2(9-x)^5$

Degree: 12

Leading Coefficient: −16

3. Convert the function to vertex form & then find the vertex and transformations from x^2:

$f(x) = 4x^2 - 24x - 5$

$4(x^2 - 6x + 9) = 5 + 36$

$\boxed{y = 4(x-3)^2 - 41}$ $\boxed{\text{vertex: } (3, -41)}$

$\boxed{\text{V. Stretch 4, Right 3, Down 41}}$

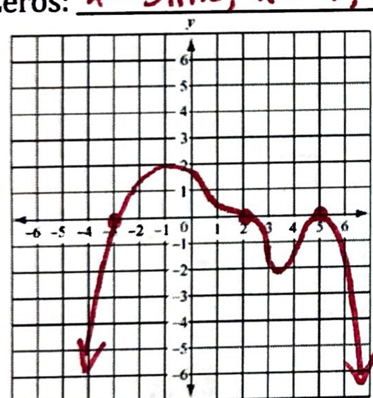
4. The current (I) in an electrical circuit varies inversely to the resistance R with a constant of variation, V. When the current is 40 amps, the resistance is 5 ohms. What is the resistance when the current is 25 amps?

$I = \frac{V}{R}$ $40 = \frac{V}{5}$ $V = 200$ $25 = \frac{200}{R}$ $\boxed{R = 8 \text{ ohms}}$

5. Find the zeros with their respective multiplicities and then sketch a graph of the function

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

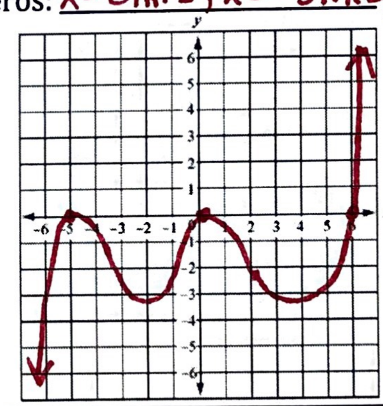
Zeros: x = 5 m.2, x = −3, x = 2 m.3



D: 6

b. $f(x) = x^2(x+5)^2(x-6)$

Zeros: x = 0 m.2, x = −5 m.2, x = 6



D: 5

6. Write a function in factored form and standard form that has degree 3 and zeros at:

a. $x = 6, x = \pm\sqrt{3}$

$(x-6)(x+\sqrt{3})(x-\sqrt{3})$

$(x-6)(x^2-3)$

$\boxed{(x^3 - 6x^2 - 3x + 18)}$

b. $x = 2, x = 7 - 2i$

$(x-2)(x-7+2i)(x-7-2i)$

$(x-2)(x^2 - 14x + 53)$

$(x^3 - 14x^2 + 53x - 2x^2 + 28x - 106)$

$\boxed{x^3 - 16x^2 + 81x - 106}$

7. Use long division or synthetic division to divide. Write the quotient with the remainder.

a. $x^4 - 40x^2 - 60x - 18 \div x - 7$

7	1	0	−40	−60	−18
	↓	7	49	63	21
	1	7	9	3	3

$\boxed{x^3 + 7x^2 + 9x + 3 + \frac{3}{x-7}}$

b. $3x^3 - 4x^2 + 2x + 4 \div x^2 - 2x + 2$

$$\begin{array}{r} 3x + 2 \\ x^2 - 2x + 2 \overline{)\, 3x^3 - 4x^2 + 2x + 4} \\ -3x^3 \pm 6x^2 \mp 6x \\ \hline 2x^2 - 4x + 4 \\ -2x^2 + 4x \mp 4 \\ \hline 0 \end{array}$$

$\boxed{3x + 2}$

8. Make a list of the possible rational zeroes and then find the actual zeroes: $f(x) = 2x^3 + 5x^2 - 2x - 5$

$$\frac{\pm 1, \pm 5}{\pm 1, \pm 2}$$

$\boxed{\pm 1, \pm \frac{1}{2}, \pm 5, \pm \frac{5}{2}}$

1	2	5	-2	-5
	↓	2	7	5
	2	7	5	0

$2x^2 + 7x + 5 = 0$

$(2x+5)(x+1)$

$\boxed{x = 1,\ x = -1,\ x = \frac{-5}{2}}$

9. $f(x) = x^4 + 3x^3 + 39x^2 + 147x - 490$ has zeros at $x = 2$ and -5. Find the other 2 zeros.

2	1	3	39	147	-490
	↓	2	10	98	490
-5	1	5	49	245	0
	↓	-5	0	-245	
	1	0	49	0	

$x^2 + 49 = 0$

$\boxed{x = \pm 7i}$

10. $f(x) = x^4 - 2x^3 - 4x^2 - 8x - 32$ has a zero at $x = 2i$. Find the other 3 zeros.

$2i$	1	-2	-4	-8	-32
	↓	$2i$	$-4-4i$	$8-16i$	32
$-2i$	1	$-2+2i$	$-8-4i$	$-16i$	0
	↓	$-2i$	$4i$	$16i$	
	1	-2	-8	0	

$x^2 - 2x - 8 = 0$

$(x-4)(x+2) = 0$

$\boxed{x = 4, -2, -2i}$

11. $f(x) = x^4 - 7x^3 - x^2 + 57x - 90$ has a zero at $x = 2 + i$. Find the other 3 zeros.

$2+i$	1	-7	-1	57	-90
	↓	$2+i$	$-11-3i$	$-21-18i$	90
$2-i$	1	$-5+i$	$-12-3i$	$36-18i$	0
	↓	$2-i$	$-6+3i$	$-36+18i$	
	1	-3	-18	0	

$x^2 - 3x - 18$

$(x-6)(x+3)$

$\boxed{x = 6,\ x = -3,\ x = 2-i}$

13. Use a sign chart to find the following from

$$f(x) = \frac{-(x+4)^2(x-2)}{(x-6)(x+1)}$$

+		+		−		+		−
	-4 m.2		-1 asy		2		6 asy	

a. $f(x) < 0$: $(-1,2) \cup (6,\infty)$

b. $f(x) \leq 0$: $[-4] \cup (-1,2] \cup (6,\infty)$

c. $f(x) > 0$: $(-\infty,-4) \cup (-4,-1) \cup (2,6)$

d. $f(x) \geq 0$: $(-\infty,-1) \cup [2,6)$

14. Solve the inequality: $f(x) = \frac{\sqrt{x-2}}{|x-9|} \geq 0$

	+		+
2		9 asy	

$\boxed{[2,9) \cup (9,\infty)}$

15. Find the product of $7 + 2i$ and its complex conjugate.

$(7+2i)(7-2i)$

$49 + \cancel{14i} - \cancel{14i} - 4i^2$

$49 + 4 = \boxed{53}$