Name: Key Date: _____ Period: _____

4.1 Graphing Polynomial Functions CYU

☑ Use when you get it right all by yourself

S Use when you did it all by yourself, but made a silly mistake

H Use when you could do it alone with a little help from teacher or peer

G Use when you completed the problem in a group

X Use when a question was attempted but wrong (get help)

N Use when a question was not even attempted

CONCEPTS	BASIC	INTERMEDIATE	ADVANCED
Polynomial function?	1 – 4	9 – 14	
Degree: Odd/Even	1 – 4	9 – 14	
Leading Coefficient (LC): Positive/Negative	1 – 4	9 – 14	
Standard form: Name	1 - 4	9 – 14	
Evaluating Polynomial Functions	5 - 8		
Describing end behavior		9, 10	
Graphing Polynomial Functions		11 - 14	

Decide whether the function is a polynomial function. If so, write it in standard form and state its degree, type, and leading coefficient.

1. $f(x) = 9x^4 + 8x^3 - 6x^{-2} + 2x$

X

2. $g(x) = \sqrt{3} - 12x + 13x^2$

$g(x) = 13x^2 - 12x + \sqrt{3}$

D: 2

LC: 13

Quadratic Trinomial

3. $m(x) = -3x + 5x^3 - 6x^2 + 2$

$m(x) = 5x^3 - 6x^2 - 3x + 2$

D: 3

LC: 5

Cubic Polynomial

4. $p(x) = \frac{1}{2}x^2 + 3x - 4x^3 + 6x^4 - 1$

$p(x) = 6x^4 - 4x^3 + \frac{1}{2}x^2 + 3x - 1$

D: 4

LC: 6

Quartic Polynomial

Evaluate the function for the given value of x. Show all work to earn full credit.

5. $h(x) = -3x^4 + 2x^3 - 12x - 6;\ x = -2$

$h(-2) = -46$; $(-2, -46)$

6. $g(x) = x^6 - 64x^4 + x^2 - 7x - 51;\ x = 8$

$g(8) = -43$; $(8, -43)$

7. $g(x) = -x^3 + 3x^2 + 5x + 1;\ g(-12)$

$g(-12) = 2101$; $(-12, 2101)$

8. $h(x) = 5x^3 - 3x^2 + 2x + 4;\ h\left(-\frac{1}{3}\right)$

$h\left(-\frac{1}{3}\right) = \frac{76}{21}$; $\left(-\frac{1}{3}, \frac{76}{21}\right)$

Describe the end behavior of the graph of the function without graphing. Use proper language.

9. $f(x) = -2x^4 + 12x^8 + 17 + 15x^2$

As $x \to \pm\infty$, $f(x) \to \infty$

10. $f(x) = 11 - 18x^2 - 5x^5 - 12x^4 - 2x$

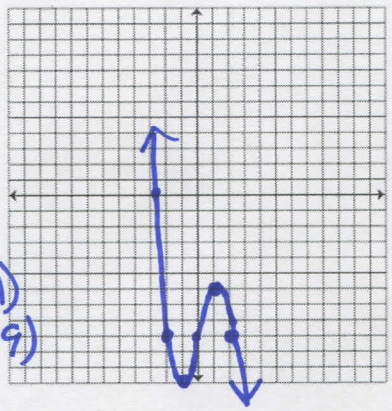
As $x \to -\infty$, $f(x) \to \infty$

As $x \to \infty$, $f(x) \to -\infty$

Graph the polynomial function. State the degree (odd/even), LC (pos/neg), y-intercept, roots, & max/min.

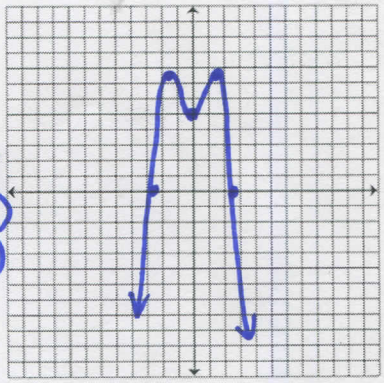
11. $f(x) = 4x - 9 - x^3$

D: 3 odd
LC: -1 neg
y-int (0, -9)
root (-2.707, 0)
max (+1.155, -5.921)
min (-1.155, -12.079)



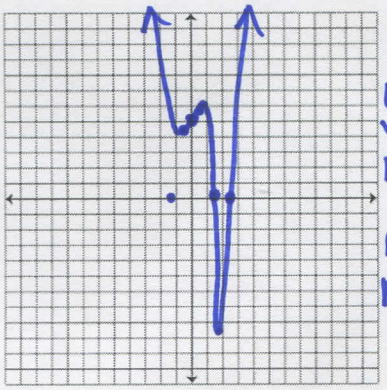
12. $h(x) = 5 + 3x^2 - x^4$

D: 4 even
LC: -1 neg
y-int: (0, 5)
roots: $x = \pm 2.048$
max: (-1.225, 7.25)
(1.225, 7.25)



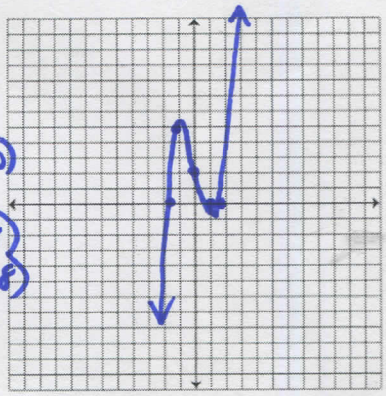
13. $p(x) = x^6 - 2x^5 - 2x^3 + x + 5$

D: 6 even
LC: 1 pos
y-int: (0, 5)
roots: (1.254, 0) & (2.268, 0)
min: (-0.363, 4.748) &
(1.925, -9.324)
max: (0.375, 5.257)



14. $p(x) = x^5 - 3x^3 + 2$

D: 5 odd
LC: 1 pos
y-int: (0, 2)
roots: (1, 0); (1.578, 0)
(-1.825, 0)
min: (1.342, -0.898)
max: (-1.342, 4.898)



15. **MODELING WITH MATHEMATICS** From 1980 to 2007 the number of drive-in theaters in the United States can be modeled by the function $d(t) = -0.141t^3 + 9.64t^2 - 232.5t + 2421$, where d(t) is the number of open theaters and t is the number of years after 1980.

a) Use a graphing calculator to graph the function for the interval $0 \le t \le 27$. Describe the behavior of the graph on this interval.

From 1980 to 2007, the # of open drive-in theaters decreased. Around the year 1995, the rate leveled off.

b) What is the average rate of change in the number of drive-in movie theaters from 1980 to 1995 and from 1995 to 2007? Interpret the average rates of change.

$\frac{d(15) - d(0)}{15 - 0} = \frac{627 - 2421}{15} \approx \boxed{-1119.6}$

-19.3

t=0 t=15
$0 \le t \le 15$
Around 120 theaters closed each year from 1980 - 1995.
Around 19 closed from 1995 to 2007.

c) Do you think this model can be used for years before 1908 or after 2007? Explain.

Drastic decrease implies not accurate. Maybe after 2007.

CYU Reflection: *How far can you go: basic, intermediate, or advanced?*

Rate your mastery level!

How confident are you with the skills this CYU covered? Circle the score you would give yourself.