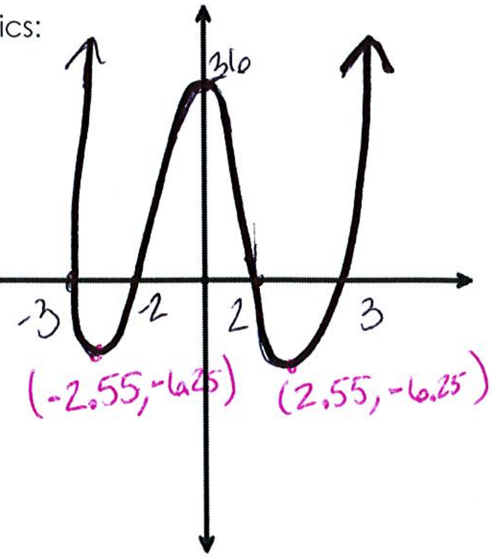
Honors Algebra 2 | Unit 3 – Polynomials | 3.11 – Test Review

Name: key **Date:** ______________

1. Graph $f(x) = x^4 - 13x^2 - 36$ and find the following characteristics:

Increasing: (-2.55,0) (2.55,∞)	Decreasing: (-∞,-2.55) (0,2.55)
x-intercepts: (-3,0)(-2,0)(2,0)(3,0)	y-intercept: (0,36)
Rel. Max: (0,36)	Rel. Min: (-2.55,-6.25) (2.55,6.25)
Abs. Max: n/a	Abs. Min: (-2.55,-6.25) (2.55,6.25)
Least possible degree: 4	Sign of leading Coeff.: positive
Symmetry: Even about y-axis	Range: [-6.25,∞)



2. Determine the end behavior and maximum number of extrema (u-turns):

$f(x) = \boxed{-3x^4} + 2x^2 - x + 2$

$x \to +\infty$ $f(x) \to$ -∞ *extrema* 3

$x \to -\infty$ $f(x) \to$ -∞

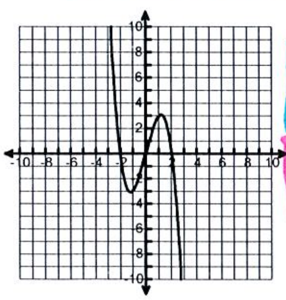
$f(x) = 2 - 4x^2 \boxed{-3x^4} - x^2$

$x \to +\infty$ $f(x) \to$ -∞ *extrema* 3

$x \to -\infty$ $f(x) \to$ -∞

3. State the sign of the leading coefficient & whether the degree is even or odd

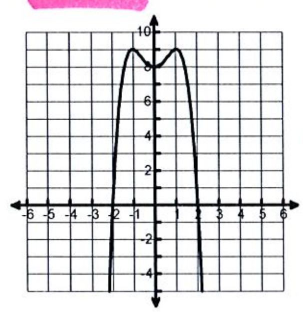
a)



negative

odd

b)



negative

even

4. State the Symmetry (Odd, Even, Neither)

$f(x) = x^4 + 2x^3 - 4x$ — Neither

$g(x) = 3x^4 - 2x^2 + 1$ — Even

$h(x) = x^5 - 3x^3$ — Odd

5. True or False

The range of a quartic function is always $(-\infty, \infty)$ — False

Odd Degree Polynomials have an Absolute Max or Absolute Min — False

A Quadratic function with a negative leading coefficient will have an Absolute Maximum — True

A Cubic Function will have 3 extrema — False

6. Verify that $(x+3)$ is a factor of $f(x) = x^4 + 9x^2 + 18$

$$\begin{array}{r|rrrrr} -3 & 1 & 0 & 9 & 0 & 18 \\ & \downarrow & -3 & 9 & -54 & 162 \\ \hline & 1 & -3 & 18 & -54 & \underline{|180} \end{array}$$

$\boxed{\text{No, not a factor!}}$

7. Determine all of the **x-intercepts** of $f(x) = x(x-3)(2x-5)$

$\boxed{(0,0)(3,0)(5/2,0)}$

8. Given the zeros, $-3, 1+2i$

a. What are the factors of the polynomial?

$(x+3)(x-1+2i)(x-1-2i)$

b. Write the equation of the polynomial.

$(x+3)[((x-1)+2i)((x-1)-2i)]$

$(x+3)[(x-1)^2 - 4i^2]$

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

$\boxed{x^3+x^2-x+15}$

9. Given the zeros, $0, -4, \sqrt{3}$

a. What are the factors of the polynomial?

$x(x+4)(x-\sqrt{3})(x+\sqrt{3})$

b. Write the equation of the polynomial.

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

$\boxed{x^4+4x^3-3x^2-12x}$

Simplify the radical

10. $\dfrac{-3 \pm \sqrt{125}}{15}$

$\dfrac{-3 \pm 5\sqrt{5}}{15}$

$\boxed{-\dfrac{1}{5} \pm \dfrac{\sqrt{5}}{3}}$

11. $\dfrac{4 \pm \sqrt{-36}}{2}$

$\dfrac{4 \pm 6i}{2}$

$\boxed{2 \pm 3i}$

Find all of the indicated zeros, roots, solutions, or factors:

12. $f(x) = 8x^3 - 125$

$a = 2x$

$b = 5$

$(2x-5)(4x^2+10x+25)$

Zeros: $\boxed{5/2,\ -\dfrac{5}{4} \pm \dfrac{5i\sqrt{3}}{4}}$

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

GCF: x^2

Factors: $\boxed{x^2(2x-1)(x+2)}$

14. $f(x) = x^3 - 7x^2 + 16x - 12$

Table

2, 3

Factors: $(x-2)(x-2)(x-3)$

15. $f(x) = 3x^3 - 11x^2 - 9x + 50$

Table

-2

Roots: $-2,\ \frac{17}{6} \pm \frac{i\sqrt{11}}{6}$

16. $f(x) = x^4 - x^3 + x^2 - 7x - 42$

Table

-2, 3

Solutions: $-2, 3, \pm i\sqrt{7}$

17. $f(x) = 2x^4 + 3x^3 - 30x^2 - 15x + 100$

Table

-4

x-intercepts: $(-4,0)(5/2,0)(\sqrt{5},0)(-\sqrt{5},0)$

18. $f(x) = x^3 + 9x^2 + 3x - 13$

Table

1

Roots: $1,\ -5 \pm 2\sqrt{3}$

19. $f(x) = x^4 - 6x^3 - 3x^2 - 24x - 28$

Table

7, -1

Factors: $(x-7)(x+1)(x-2i)(x+2i)$