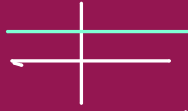


POLYNOMIAL GRAPHS


$$f(x) = 2x^0$$

$y = 2$



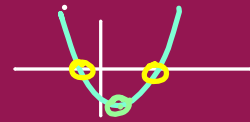
$$f(x) = 2x + 3$$

linear



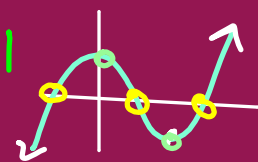
$$f(x) = -3x^2 - 4x + 7$$

quadratic



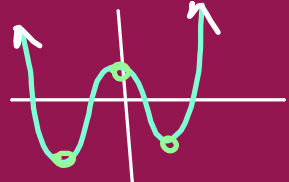
$$f(x) = x^3 - 3x^2 + x + 1$$

cubic



$$f(x) = x^4 - 4x^3 - 9x^2 + 16x + 20$$

quartic



- many terms
- 1 or more terms
- exponents are whole #'s

Degree = highest power

* Max # of x-int = Degree
 * Max # of peaks/Valleys = Degree - 1

End Behavior

Even degree = both ends go in same direction

Odd degree = ends go in opposite directions

Negative leading coeff. - ends flip direction

Name _____

POLYNOMIALS HANDOUT

For each function, determine if it is a polynomial and then state the degree, the name, and the leading coefficient.

P 1. $f(x) = -3x + 5x^3 - 6x + 2$

No 2. $f(x) = 9x^4 + 8x^3 - 6x^{-2} - 1$

No 3. $f(x) = 3x^4 + 2x - \frac{5}{x} - 9x^2 - 7$

P 4. $f(x) = \frac{5}{3}x^2 - \sqrt{7}x^4 + 8x^3 - \frac{1}{2} + x$

Match each function and graph.

E 5. $f(x) = -3x^2 + 8x - 1$

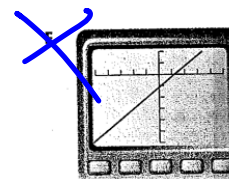
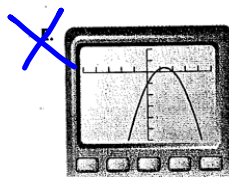
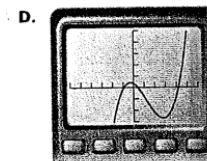
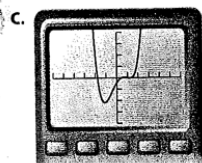
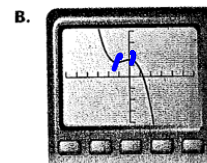
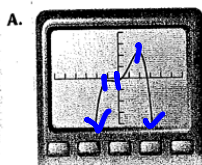
A 6. $f(x) = -x^4 + x^3 + 4x^2 + 2x - 1$

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

F 8. $f(x) = 4x^1 - 5$

C 9. $f(x) = 2x^4 - 2x^3 - 5x^2 + 7x - 2$
+ even

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



11. $f(x) = 9x^3 - 4 + x^2$

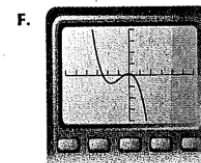
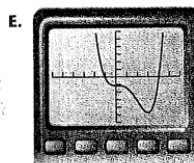
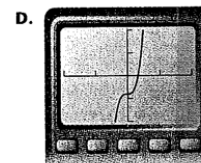
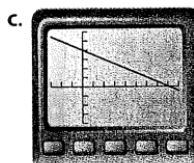
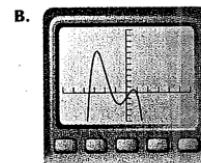
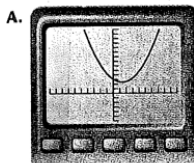
12. $f(x) = 0.4x^2 - x + 3$

13. $f(x) = x^4 - 4x^3 + x^2 - 6$

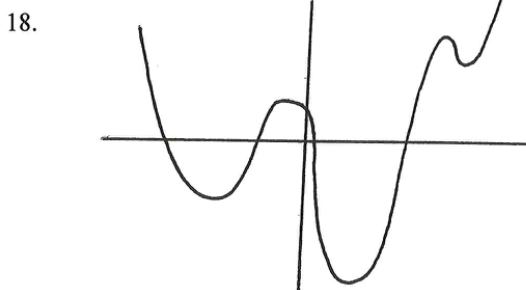
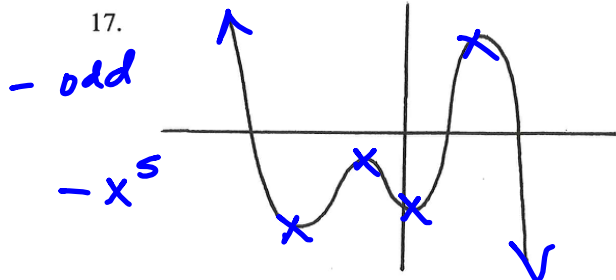
14. $f(x) = -3x^3 - 8x^2 - x + 1$

15. $f(x) = 8 - x$

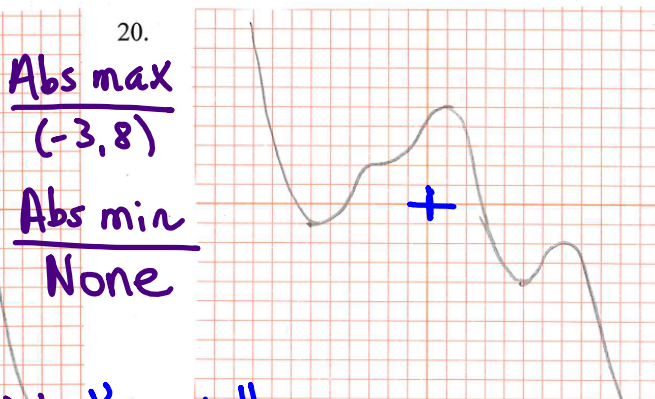
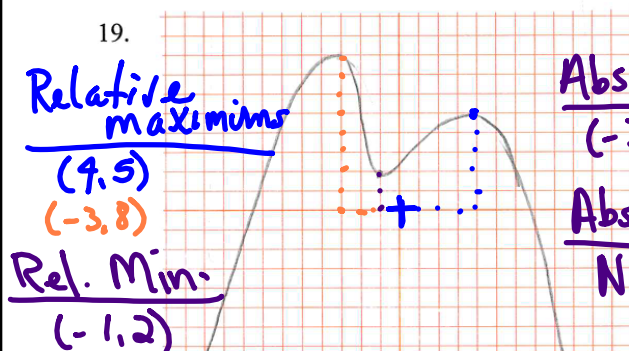
16. $f(x) = -x^4 - 4x^3 + x^2 + 6x - 2$



Describe the degree and sign of the leading coefficient of the polynomial function using the graph.



For each function, identify (a) intervals where the function is increasing or decreasing, (b) coordinates of all relative maximums and minimums, and (c) coordinates of all absolute maximums and minimums.



Relative extrema - any peak or valley
 Absolute extrema - the highest & lowest pts

Find the real zeros of each polynomial using your calculator. Round to hundredths.

21. $f(x) = x^4 + 2x^3 - x - 1$

22. $f(x) = -x^5 + 9x^3 - 9x$

POLYNOMIAL OPERATIONS

$$(\underline{4x^3} + \underline{2x^7} + \underline{3x} - 9) + (\underline{-x^6} + \underline{7x^7} + \underline{4x^3} + 8)$$

$$= -5x^7 - x^6 + 8x^3 + 3x - 17$$

$$(2x+3)(4x-1)(x+5)$$

$$= 8x^2 - 2x + 12x - 3$$

$$= (8x^2 + 10x - 3)(x+5)$$

$$= 8x^3 + 10x^2 - 3x + 40x^2 + 50x - 15$$

$$= 8x^3 + 50x^2 + 47x - 15$$

Special Cases

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

$$= 16x^2 - 9$$

Conjugates

FL

$$(3x-7)^2 = (3x-7)(3x-7)$$

$$= 9x^2 - 21x - 21x + 49$$

$$= 9x^2 - 42x + 49$$

FACTORIZING

★ First Step = Pull out Common Factors

2 terms ↙ Conjugates

$$a^2 - b^2 = (a - b)(a + b)$$

$$a^2 + b^2 = \text{unfactorable}$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$x^3 - 8 = (x - 2)(x^2 + 2x + 4)$$

$$2x^3 + 432 = 2(x^3 + 216)$$

$$= 2(x + 6)(x^2 - 6x + 36)$$

$$5x^2 - 45$$

$$5(x^2 - 9)$$

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

$$49x^2 - 100$$

$$(7x + 10)(7x - 10)$$

$$x^2 + 4$$

unfactorable

3 terms = UNFOIL

$$x^2 + 2x - 15$$

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

- 3x
+ 5x

4 terms

$$3x^3 + 15x^2 - 2x - 10$$

