Name _____ Date _____

Chapter 7 Review – Polynomial Functions

State the degree and leading coefficient of each polynomial in one variable. If it is not a polynomial in one variable, explain why.

1. $2n^2 + 2m^2$

no- 2 var.

2. $5 - 3a^2$

2, -3

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

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

5, 1

Find p(5) and p(-1) for each equation.

4. $p(x) = 7x - 3$

32, -10

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

-54, -12

6. $p(x) = 5x^4 + 2x^2 - 2x$

3165, 9

If $p(x) = -2x^2 + 5x + 1$ and $q(x) = x^3 - 1$, find each value.

7. $q(n)$

$n^3 - 1$

8. $p(2b)$

$-8b^2 + 10b + 1$

9. $q(z^3)$

$z^9 - 1$

10. $p(3m^2)$

$-18m^4 + 15m^2 + 1$

11. $q(x + 1)$

$x^3 + 3x^2 + 3x$

Given a polynomial and one of its factors, find the remaining factors of the polynomial.

12. $(x^3 - x^2 + x + 14)$; $(x + 2)$

$x^2 - 3x + 7$

13. $2x^3 + x^2 - 41x + 20)$; $(x - 4)$

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

14. $(x^3 - 8)$; $(x - 2)$

$x^2 + 2x + 4$

Solve each equation and state the number and type of roots.

15. $-5x - 7 = 0$

$-7/5$, 1 real

16. $3x^2 + 10 = 0$

$\dfrac{\pm i\sqrt{30}}{3}$

2 imag.

17. $x^4 - 2x^3 - 7x^2 - 2x - 8 = 0$

-2, 4, ±i

2 real

2 imag.

18. $x^4 - 2x^3 = 23x^2 - 60x$

-5, 0, 3, 4

4 real

Find all zeros of the function.

19. $f(x) = x^3 - 7x^2 + 16x - 10$

1, 3±i

20. $f(x) = 10x^3 + 7x^2 - 82x + 56$

-7/2, 4/5, 2

21. $f(x) = x^3 - 16x^2 + 79x - 114$

6, 5±√6

Write a polynomial function of least degree with the integral coefficients that has the given zeros.
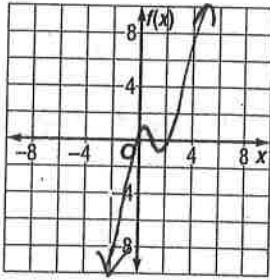
22. -3, 1, 2

$f(x) = x^3 - 7x + 6$
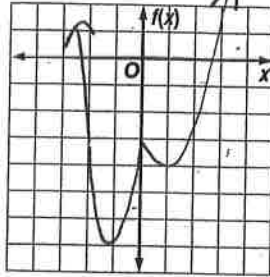
23. -6, 6, -5i, 5i

$f(x) = x^4 - 11x^2 - 900$

Graph each function by making a table of values. Determine the values of x at which or between which each real zero is located.
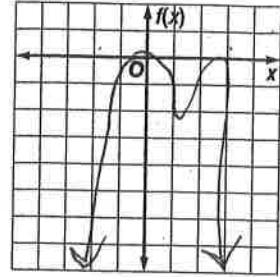
1. $f(x) = x^3 - 2x^2 + 1$

between 0 and -1
at 1; between 1 & 2
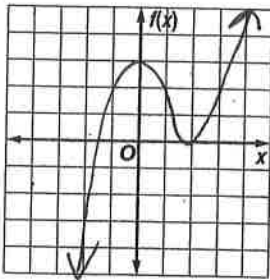
2. $f(x) = x^4 + 2x^3 - 5$

between -2 & -3
between 1 & 2

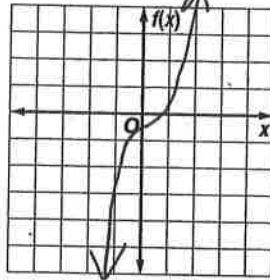**3.** $f(x) = -x^4 + 2x^2 - 1$

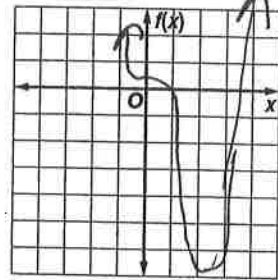

at ±1

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

at -1, 2

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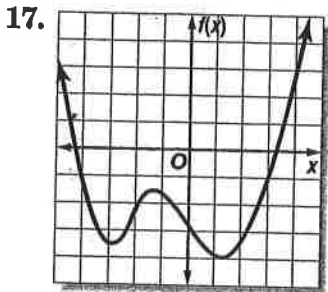

between 0 & 1

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

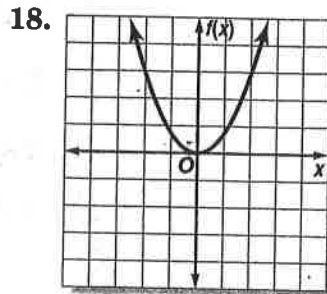between 0 & 1
between 2 & 3

For each graph,
a. describe the end behavior,
b. determine whether it represents an odd-degree or an even-degree polynomial function, and
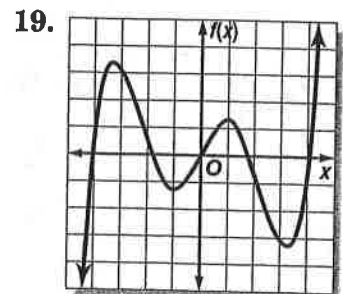c. state the number of real zeroes.

17.

up, up
even
2

18.

up
up
even
1

19.

down up
odd 5

Note: Graphs at end are ROUGH sketches - please be accurate on your Test!

1-3) Degree is highest exponent, leading coefficient must be part of the term with highest degree.

1. n + m are both variables, so not a polynomial in 1 variable

2. 2 is the highest exponent, -3 is the coefficient with that term so degree = 2, l.c. = -3

3. Don't forget to FOIL this one before naming the degree. First terms give you x^5, so degree = 5, l.c. = 1

4-6) Just plug in 5 and -1 for x in each problem. You should have 2 numerical values for each answer.

7-11) If the question has p( ) use the function p(x), if g( ) then use g(x). Again you are just substituting the value. This time you will end up with expressions for your answers. Be sure to simplify when needed!

12-14) Use synthetic division for each!

12.
$$-2 \overline{\big| \begin{array}{cccc} 1 & -1 & 1 & 14 \\ & -2 & 6 & -14 \\ \hline 1 & -3 & 7 & \underline{0} \end{array}}$$
$$x^2 - 3x + 7$$

13.
$$4 \overline{\big| \begin{array}{cccc} 2 & 1 & -41 & 20 \\ & 8 & 36 & -20 \\ \hline 2 & 9 & -5 & \underline{0} \end{array}}$$
$$2x^2 + 9x - 5 \text{ (factor)}$$
$$(x+5)(2x-1)$$

14. $x^3 - 8$
$$+2 \overline{\big| \begin{array}{cccc} 1 & 0 & 0 & -8 \\ & 2 & 4 & 8 \\ \hline 1 & 2 & 4 & \underline{0} \end{array}}$$
$$x^2 + 2x + 4$$

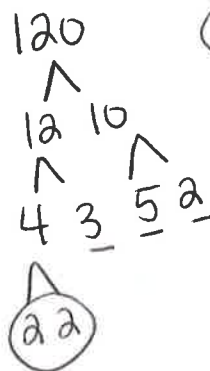Remember if a factor - remainder is ALWAYS zero!

15-18) Solve for x in each.

15. $-5x-7=0$

$-5x=7$

$\boxed{x=-7/5}$

16. $3x^2+10=0$

won't factor, use quad. form.
(no b term)

$$\frac{\pm\sqrt{-4(3)(10)}}{2(3)}$$

$$\pm\frac{\sqrt{-120}}{6} \leftarrow \text{simplify}$$

$$\pm\frac{2i\sqrt{30}}{6} = \pm\frac{i\sqrt{30}}{3}$$

Simplify fraction!

120
∧
12 10
∧   ∧
4 3 5 2
∧
(2 2)

17. put in calculator to find all real zeros that are possible from the table. (2 in this case: -2,4) since degree = 4 must be 2 others so 2 real & 2 imaginary → (use synthetic division then quad. form to find complex/imag.)

18. ALL 4 found in table - ALL Real.

19-21) Graph in calculator to look at table for real zeros. use synthetic division, then quadratic formula or factoring once you have a squared term (quadratic function)

22-23) Find factors for each, then FOIL. Remember the rule for conjugates even if both aren't given to you!

22. $(x+3)(x-1)(x-2)$
⌞___FOIL___⌟ then multiply this

23. $(x-6)(x+6)(x-5i)(x+5i)$
FOIL   FOIL
      multiply

* DON'T FORGET TO SIMPLIFY!