Algebra 2
Chapter 5 Self Assessment

Put in standard form. Then classify by degree and number of terms.

1. $x^3 - 4x^5 + 3 - x$

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

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

3. Evaluate the polynomial function for $x = -2, -1, 0, 1, 2$. Then graph the function. Then describe the end behavior of the graph of the function.

$y = -x^4 + 8$

x	y
-2	$-(-2)^4 + 8 = -8$
-1	$-(-1)^4 + 8 = 7$
0	$-(0)^4 + 8 = 8$
1	$-(1)^4 + 8 = 7$
2	$-(2)^4 + 8 = -8$
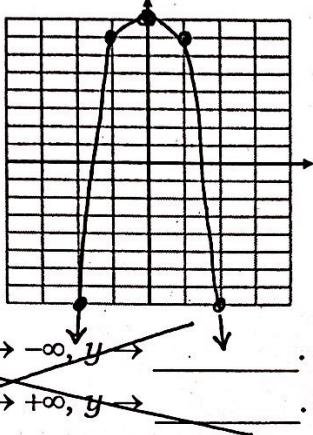
End behavior $\begin{cases} \text{As } x \to -\infty, y \to \underline{\hspace{2cm}} \\ \text{As } x \to +\infty, y \to \underline{\hspace{2cm}} \end{cases}$

Determine the lowest degree polynomial that has the given graph. Then give a possible leading term. State the domain and range.

4.

5.
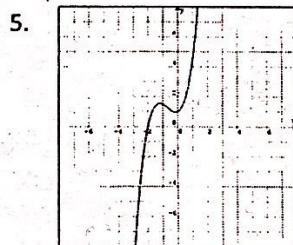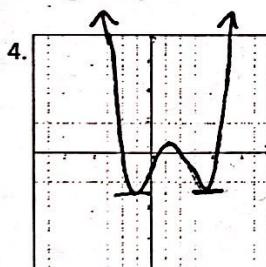
Find all solutions and state the multiplicity of each.

7. $x^3 - 2x^2 = 3x$

$x^3 - 2x^2 - 3x = 0$

$x(x^2 - 2x - 3) = 0$

$x(x-3)(x+1) = 0$

8. $x^4 - 16 = 0$

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

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

$x-2=0 \quad x+2=0 \quad x^2+4=0$

$x=2 \quad x=-2 \quad \sqrt{x^2}=\sqrt{-4}$

$x = \pm 2i$

9. $8x^3 + 343 = 0$

$(2x+7)(4x^2-14x+49)$

$x = -7/2$

$x = \dfrac{14 \pm \sqrt{14^2 - 4(4)(49)}}{2(4)}$

$x = \dfrac{14 \pm \sqrt{-588}}{8} = \dfrac{14 \pm 14i\sqrt{3}}{8}$

Factor the polynomial.

10. $15x^3y^3 + 10x^2y^2 + 5xy$

$5xy(3x^2y^2 + 5xy + 1)$

11. $x^3 - 3x^2 + 5x - 15$

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

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

12. $100x^2 - 9y^2$

$(10x - 3y)(10x + 3y)$

Answers column:

1. $-4x^5 + x^3 - x + 3$

Classify: Quintic Polynomial

2. $x^3 - 2x^2 + 2$

Classify: Cubic trinomial

3. End Behavior:

On the left, the graph falls.

On the right, the graph falls.

4. $2x^4$ any positive number

Domain: $\mathbb{R}$; Range: $y \geq -2$

5. $2x^3$ any positive #

Domain: $\mathbb{R}$; Range: $\mathbb{R}$

7. $\underset{m=1}{x=0}, \underset{m=1}{x=3}, \underset{m=1}{x=-1}$

8. $\underset{m=1}{x=2}, -2, 2i, -2i$

9. $x = -7/2, \quad \dfrac{7 \pm 7i\sqrt{3}}{4}$

10. $5xy(3x^2y^2 + 5xy + 1)$

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

12. $(10x-3y)(10x+3y)$

Solve the equation.

13. $5x^3 = 30x - 25x^2$

$5x^3 + 25x^2 - 30x = 0$

$5x(x^2 + 5x - 6) = 0$

$5x(x+6)(x-1) = 0$

Write a possible polynomial given the following zeros.

14. 1, -1, -2

$y = (x-1)(x+1)(x+2)$

$y = (x-1)(x^2 + 2x + x + 2)$

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

13. $\underline{x = 0, -6, 1}$

14. $\underline{y = x^3 + 2x^2 - x - 2}$

15. Use synthetic division or substitution to determine if x-1 is a factor of $x^3 + x^2 - 16x - 16$.

$\underline{1|} \quad 1 \quad 1 \quad -16 \quad -16$ ⑂

$\qquad\qquad 1 \quad 2 \quad -14$

$\underline{\qquad\qquad\qquad\qquad\qquad}$

$\quad 1 \quad 2 \quad -14 \quad \boxed{-30}$

$(1)^3 + (1)^2 - 16(1) - 16$

$1 + 1 - 16 - 16$

$2 - 16 - 16$

$-14 - 16 = \boxed{-30}$

15. $\underline{\text{Not a factor}}$ b/c remainder ≠ 0

Divide using long division.
Is the divisor a factor?

16. $(2x^3 + 11x^2 + 18x + 9) \div (x^2 + 3)$

$$x^2 + 3 \,\overline{\smash{\big)}\, \begin{array}{r} 2x + 11 \\ 2x^3 + 11x^2 + 18x + 9 \end{array}}$$

$-(2x^3 \qquad\quad + 6x)$

$\underline{\qquad\qquad\qquad\qquad}$

$\qquad 11x^2 + 12x + 9$

$-(11x^2 \qquad\quad + 33)$

$\underline{\qquad\qquad\qquad\qquad}$

$\qquad\qquad 12x - 24$

Divide using synthetic division.
Is the divisor a factor?

17. $(8x^4 - 4x^2 + x + 4) \div (x + 1)$

$\underline{-1|} \quad 8 \quad 0 \quad -4 \quad 1 \quad 4$

$\qquad\qquad -8 \quad 8 \quad -4 \quad 3$

$\underline{\qquad\qquad\qquad\qquad\qquad\qquad}$

$\quad 8 \quad -8 \quad 4 \quad -3 \quad \boxed{7}$

16. $\underline{2x + 11 + \dfrac{12x - 24}{x^2 + 3}}$

Factor: YES   (NO)

17. $\underline{8x^3 - 8x^2 + 4x - 3 + \dfrac{7}{x+1}}$

Factor: YES   (NO)

Pascal's Triangle:

1

1 1

1 2 1

1 3 3 1

1 4 ⑥ 4 1

1 5 10 10 5 1

Find the following using Pascal's Triangle.

18. Expand $(2x + 3)^4$

$4(8x^3)(3) \quad 6(4x^2)(9) \quad 4(2)(27)$

$1(2x)^4 + 4(2x)^3(3) + 6(2x)^2(3)^2 + 4(2x)^1(3)^3 + 1(2x)^0(3)^4$

$16x^4 + 96x^3 + 216x^2 + 216x + 81$

19. Find the 3rd term of the expansion of $(3a - 2b)^4$

$6(3a)^2(-2b)^2$

$6(9a^2)(4b^2)$

18. $16x^4 + 96x^3 + 216x^2 + 216x + 8$

19. $\underline{216a^2b^2}$

20. Put together all the information you have learned in this chapter to make a rough sketch of polynomial:

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

Sketch:

Degree: $2 + 3 + 2 + 1 = \boxed{8}$
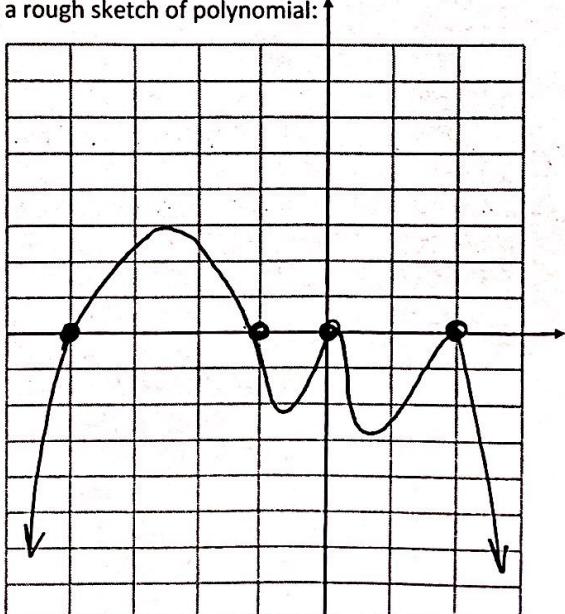
End Behavior:

On the left, the graph falls
On the right, the graph falls

Zeros and multiplicity:

$x = 0 \qquad x = -4 \qquad x = 2 \qquad x = -1$

$m = 2 \qquad m = 3 \qquad m = 2 \qquad m = 1$

touch   cross   touch   cross