A2H: Chapter 2 Review

I. Simplify. Your answer should only contain positive exponents.

1. $2y^3 \cdot 3xy^3 \div 3x^2y^4$

2. $\dfrac{3x^0y^2}{2x^{-1}4yx^2} \div \dfrac{\left(2x^{-4}\right)^3}{2y^{-4}}$

II. Evaluate each polynomial using synthetic substitution.

$f(x) = x^2 + 5x + 1 \qquad g(x) = 4x^4 - 7x^3 + 6x^2 - 5 \qquad h(x) = 7 - x \qquad m(x) = 7x^2$

3. $h(-3)$

4. $8g(2)$

III.

a. Simplify each expression given the following polynomials.
b. State the degree and leading coefficient, or state *why* the answer does not represent a polynomial.
c. Classify your answer by degree and number of terms. If the expression does not represent a polynomial, do not classify.

$f(x) = 9 - x^2$	$g(x) = 4x^4 + 8x^3 - 37x^2 - 74x + 13$	$h(x) = x - 3$	$m(x) = 2x^2$

5. $h - f$

6. f^3

7. $\dfrac{f}{h}$

8. $\dfrac{g}{f}$

9. $\dfrac{g}{m}$

IV. Describe the end behavior. Express your answer formally.

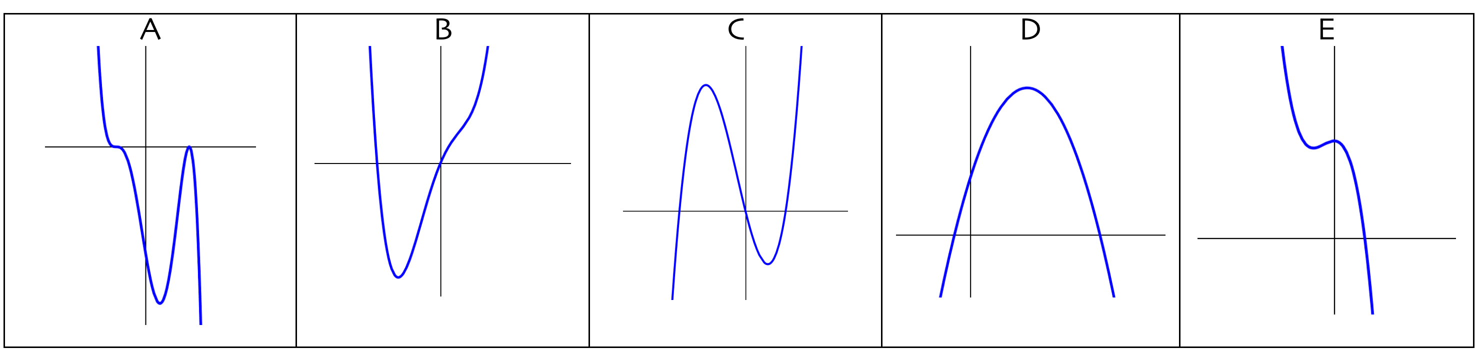
10. $f(x) = x^3 + 3x^2 - 4x$

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

12. $f(x) = -2x^2 + 8x + 5$

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

V. Match each polynomial to its graph.



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

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

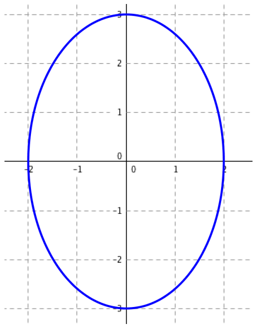
16. $f(x) = -2x^2 + 8x + 5$

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

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

VI. Determine if each graph is symmetric over the x-axis, y-axis, origin or y=x. Then state if each graph represents is even or odd function, if possible.

19.



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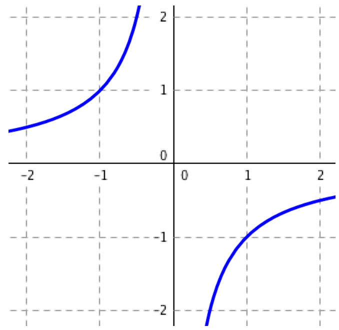

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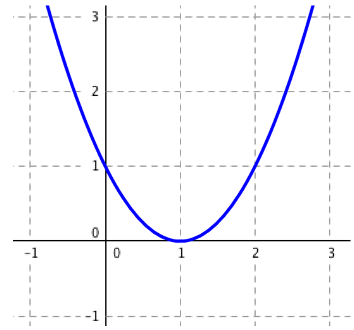


VII. Test each equation *algebraically* for x-axis, y-axis, origin or y=x symmetry.

22. $xy = 17$

23. $3x^4 + 5x^2y^6 - 7y^8 = -9$

VIII. Determine *algebraically* if each function is even/odd or neither.

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

25. $g(x) = 16x^4 - 8x^2 + 1$

IX. Sketch the graph of each polynomial function.

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

27. $g(x) = 16x^4 - 8x^2 + 1$

X. Find the average rate of change for each polynomial over the indicated interval.

28. $f(x) = 9 - x^3$, [-3, -2]

29. $g(x) = 5$, [1000, 2000]

XI. Determine if $g(x)$ is a factor of $f(x)$. Explain your reasoning.

30. $f(x) = x^4 - 1$, $g(x) = x^2 + 1$

31. $f(x) = x^3 - 2x^2 + x - 5$, $g(x) = x - 3$

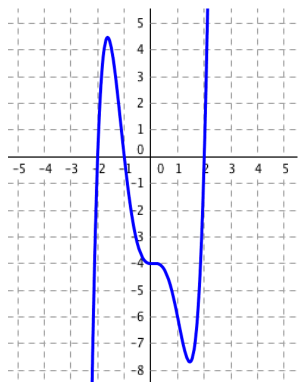
XII. CALCUALTOR – Round all answers to three decimal places.

32. $f(x) = \frac{1}{2}x^4 + x^2 - 6x - 5$

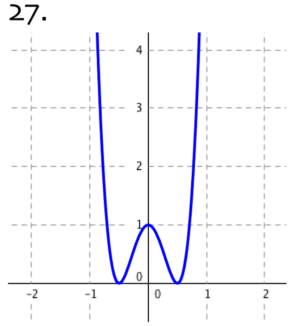
a) How many turning points does the function have?
b) Find the real zero(s).
c) How many zeros are imaginary? How do you know?
d) Determine the point(s), if any, at which the function has a relative maximum.
e) Determine the point(s), if any, at which the function has a relative minimum.
f) Determine the domain on which the function is increasing. Use *SET* notation.
g) Determine the domain on which the function is decreasing. Use *SET* notation.
h) Determine the domain on which the function is positive. Use *SET* notation.
i) Determine the domain on which the function is negative. Use *SET* notation.
j) State the domain and range in *SET* notation.

ANSWERS

1. $\dfrac{2y^2}{x}$
2. $\dfrac{3x^{11}}{32y^3}$
3. 10
4. 216
5.
   a. x^2+x-12
   b. Degree: 2, Leading Coefficient: 1
   c. quadratic trinomial
6.
   a. $-x^6+27x^4-243x^2+729$
   b. Degree: 6, Leading Coefficient: -1
   c. 6^{th} degree polynomial
7.
   a. $-x-3$
   b. Degree: 1, Leading Coefficient: -1
   c. Linear binomial
8.
   a. $-4x^2-8x+1-\dfrac{2x-4}{9-x^2}$
   b. The answer to part a. is not a polynomial since the remainder term involves division by variables.
   c. none
9.
   a. $2x^2+4x-\dfrac{37}{2}-\dfrac{37}{x}+\dfrac{13}{x^2}$
   b. The answer to part a. is not a polynomial since the last two terms involve division by variables.
   c. none
10. $x\to-\infty,\ \mathrm{f}(x)\to-\infty$
    $x\to\infty,\ \mathrm{f}(x)\to\infty$
11. $x\to-\infty,\ \mathrm{f}(x)\to\infty$
    $x\to\infty,\ \mathrm{f}(x)\to\infty$
12. $x\to-\infty,\ \mathrm{f}(x)\to-\infty$
    $x\to\infty,\ \mathrm{f}(x)\to-\infty$
13. $x\to-\infty,\ \mathrm{f}(x)\to\infty$
    $x\to\infty,\ \mathrm{f}(x)\to-\infty$
14. C
15. B
16. D
17. E
18. A
19. x-axis, y-axis; neither even nor odd
20. origin, y=x; odd
21. no symmetry; neither even nor odd
22. origin, y=x
23. x-axis, y-axis
24. neither, $f(-x)\neq f(x)$ or $f(-x)$
25. even, $f(-x)=f(x)$
26.



27.



28. -19
29. 0
30. $g(x)$ is a factor of $f(x)$ because $\dfrac{f(x)}{g(x)}$ yields a remainder of 0.
31. $g(x)$ is not a factor of $f(x)$ because $\dfrac{f(x)}{g(x)}$ does not yield a remainder of 0.

32.

a. 1
b. x=-7.723, 2.279
c. 2 zeros are imaginary. There are 2 real zeros because there are two x-intercepts. Since each zero crosses through the x-axis the multiplicity of these zeros must be odd and 1. In addition the degree is 4, hence there are four zeros. If two are real then the other 2 zeros must be imaginary.
d. None
e. (1.213, -9.724)
f. $\{x | x > 1.213\}$
g. $\{x | x < 1.213\}$
h. $\{x | x < -7.723 \text{ or } x > 2.279\}$
i. $\{x | -7.723 < x < 2.279\}$
j. $\{x | x \in R\}$, $\{y | y \geq -9.724\}$