A2H: Chapter 2 Review

Simplify. Your answer should only contain positive exponents.

1. $\left(2y^3\right)\left(3xy^3\right)\div\left(3x^2y^4\right)$

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

Evaluate each polynomial using synthetic substitution.

3. $h(x)=7-x$, $h(-3)$

4. $g(x)=4x^4-7x^3+6x^2-5$, $8g(2)$

For each problem:

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. $\dfrac{g}{m}$

Describe the end behavior.

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

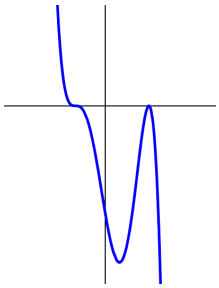
11. $f(x)=x^4-3x^2+6x$

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

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

Match each polynomial to its graph.

A



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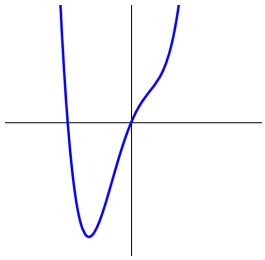

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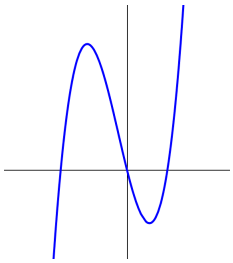

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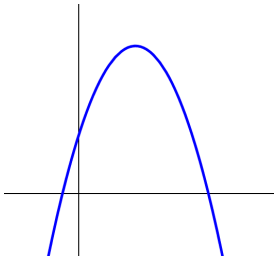

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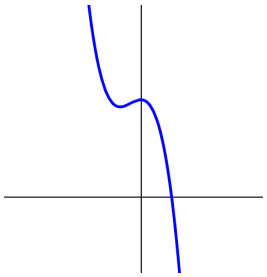


14. $f(x)=x^3+x^2-4x$

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

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

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

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

Sketch the graph of each polynomial function.

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

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

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

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

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

Find all zeros.

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

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

25. $f(x)=18x^4-54x^2+40$

26. $f(x)=64x^7+x^4$

27. $f(x)=6x^3+5x^2-9x+2$

28. If $x-k$ is a factor of x^3+2x^2-2x-k, what are the possible values of *k*?

29. (A bit tough, but doable)…If $f(2-i)=0$, find all zeros of $f(x)=x^5-6x^4+11x^3-x^2-14x+5$.

30. A clothing manufacturer's profitability can be modeled by $p(x)=-x^4+40x^2-144$, where *x* is the number of items sold in thousands and $p(x)$ is the company's profit in thousands of dollars. For what x-value(s) will the company earn no profit?

31. Which of the following statements about a polynomial function with degree *n* is ***FALSE***?

a) has at most *n* turning points
b) may have up to *n* distinct zeros
c) if *n* is odd, it has at least one real zero
d) if *n* is even, it may have no x-intercepts
e) if *n* is odd, the end behavior will be opposite

32. The volume of a rectangular prism is 440 cubic centimeters. The dimensions of the figure are x, $x-3$ and $x+3$. Write a polynomial equation in standard form that can be used to find the dimensions of the rectangular prism.

33. A polynomial $f(x)$ is divided by $x-c$. What can you conclude if:
a) the remainder is 0?
b) the remainder is 1?

34. If $f(x)$ has a degree of 5 and a positive leading coefficient and $g(x)$ has a degree of 3 and has a positive leading coefficient, determine the end behavior of $\frac{f(x)}{g(x)}$. Explain your reasoning.

35. Sketch the graph of a polynomial with the given characteristics:

- 5^{th} degree
- end behavior: $x \to \infty \quad y \to \infty$ / $x \to -\infty \quad y \to -\infty$
- two imaginary zeros
- one bouncing negative zero

36. True or False: If False, explain why.

a) An even degree polynomial has a range of all real numbers.
b) Only polynomials with a constant term of 0 will pass through the origin.
c) A cubic polynomials can five terms.
d) Odd degree polynomials must have at least one x-intercept.
e) A quartic trinomial can have at most three turning points.
f) Algebra 2 is awesome.

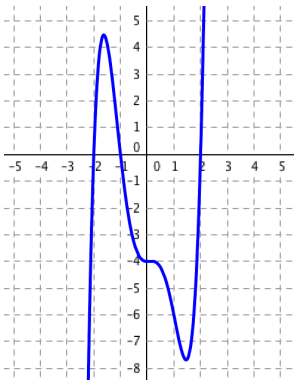
ANSWERS

1. $\frac{2y^2}{x}$	2. $\frac{3x^{11}}{32y^3}$	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. $-4x^2-8x+1-\frac{2x-4}{9-x^2}$ b. The answer to part a. is not a polynomial since the remainder term involves division by variables. c. none	9. a. $2x^2+4x-\frac{37}{2}-\frac{37}{x}+\frac{13}{2x^2}$ b. The answer to part a. is not a polynomial since the last two terms involve division by variables. c. none	10. $x\to-\infty,\ f(x)\to-\infty$ $x\to\infty,\ f(x)\to\infty$
11. $x\to-\infty,\ f(x)\to\infty$ $x\to\infty,\ f(x)\to\infty$	12. $x\to-\infty,\ f(x)\to-\infty$ $x\to\infty,\ f(x)\to-\infty$	13. $x\to-\infty,\ f(x)\to\infty$ $x\to\infty,\ f(x)\to-\infty$

14. C	15. B	16. D	17. E	18. A

19.



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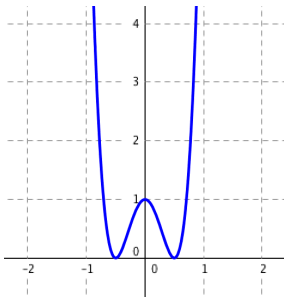


21. $g(x)$ is a factor of $f(x)$ because $\frac{f(x)}{g(x)}$ yields a remainder of 0.	22. $g(x)$ is not a factor of $f(x)$ because $\frac{f(x)}{g(x)}$ does not yield a remainder of 0.	23. x=-2, $\pm 3i$
24. x=0, $\pm i\sqrt{2}$	25. x= $\pm\frac{2\sqrt{3}}{3}$, $\pm\frac{\sqrt{15}}{3}$	26. x=0 multiplicity 4, $-\frac{1}{4}$, $\frac{1\pm i\sqrt{3}}{8}$
27. x= $\frac{2}{3}, \frac{-3\pm\sqrt{17}}{4}$	28. -3, 0, 1	29. x= $2\pm i$, -1, $\frac{3\pm\sqrt{5}}{2}$

30. 2000 and 6000 t-shirts

31. A

32. $x^3 - 9x - 440 = 0$

33.

a) $x - c$ is a factor of $f(x)$

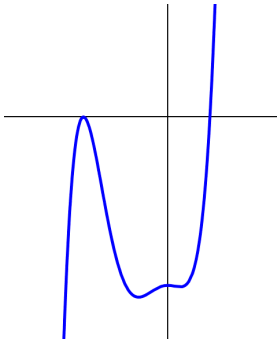
b) $x - c$ is NOT a factor of $f(x)$

34. A quintic polynomial divided by a cubic polynomial will yield a quadratic. If both leading coefficients are positive the quotient will also have a positive leading coefficient.

$x \to -\infty,\ f(x) \to \infty$

$x \to \infty,\ f(x) \to \infty$

35. (a possible sketch)



36.

a) False. Even degreed polynomials have the same end behavior so they will have a maximum or minimum y-value and a restricted range.

b) True.

c) False. A cubic polynomial can have at most four terms.

d) True. Odd degreed polynomials have the opposite end behavior and a range of all real numbers so there must be one real number, x, such that $f(x) = 0$.

e) True.

f) True. (DUH!)