BECA / Huson / Algebra 2: Polynomials
19 November 2024

First and last name:
Section:

3.5 Trimester Final Exam **A2.A.APR.6**

A2-APR.1 Perform operations with polynomials

1. Find the sum in standard form $(x^2 - 4x - 7) + (2x^2 - 2x + 11)$.

2. Find the difference $f(x) - g(x)$ as a polynomial in standard form, given $f(x) = 3x^4 - 2x^3 + 5x^2 - 3x + 4$ and $g(x) = 2x^4 + 2x^2 + x - 1$.

3. Select each correct equation.

   (a) $x^2 - 25 = x^2 - 5^2$
   (b) $x^2 - 25 = (x - 5)(x + 5)$
   (c) $x^2 + 25 = (x - 5)(x + 5)$
   (d) $x^2 - 10x + 25 = (x - 5)^2$
   (e) $x^2 + 10x + 25 = (x + 5)^2$
   (f) $x^2 - 10x - 25 = (x - 5)^2$

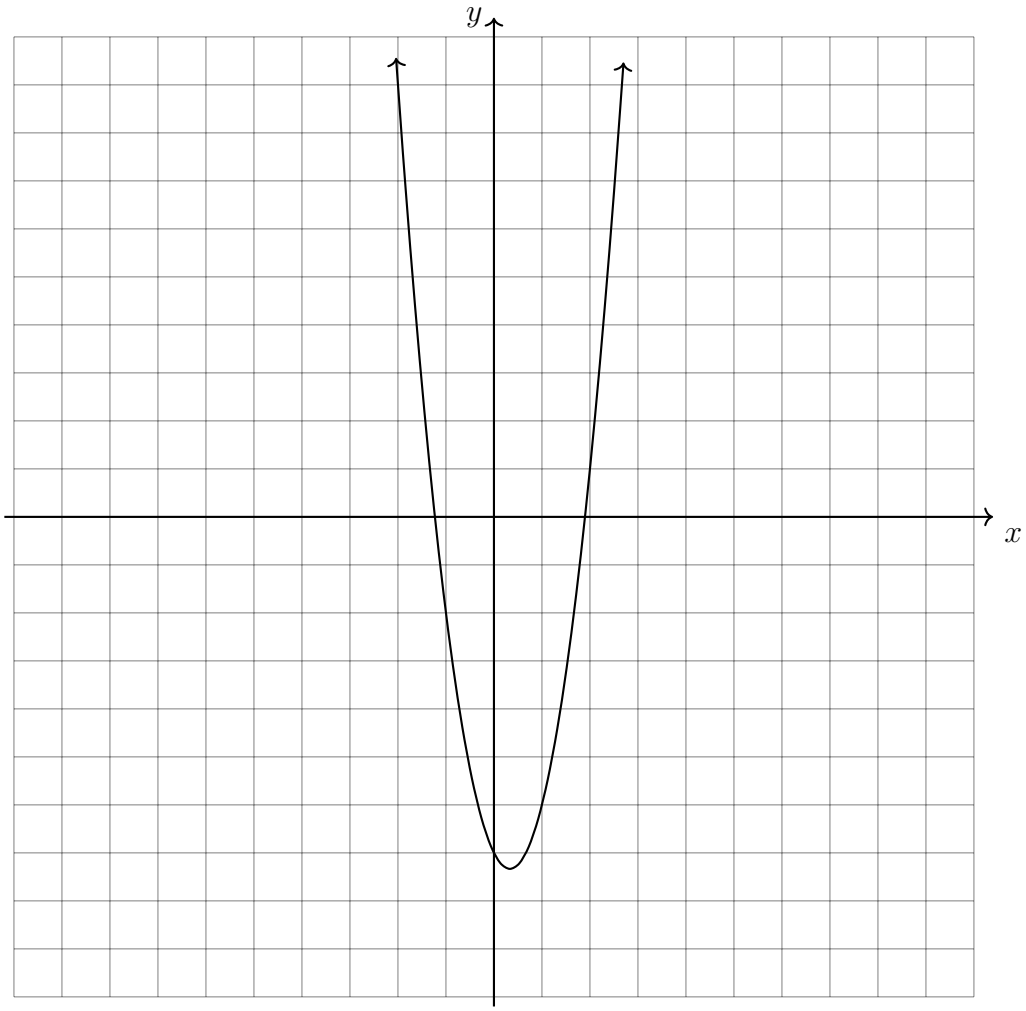
4. Which equations represent correct polynomial identities?

   (a) $x^3 - y^3 = (x - y)^3$
   (b) $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$
   (c) $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$
   (d) $x^3 + y^3 = (x - y)(x^2 + xy + y^2)$

A2-F.IF.7a Graph linear and quadratic functions, show key features

5. One equation of a system is graphed.
   (a) Graph the second equation, labeling the intersections as ordered pairs.
   (b) Find the value of the leading coefficient a of the quadratic equation.

$y = ax^2 - 2x - 7$ $\qquad\qquad$ $x - y = 1$



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A2-A.APR.3 Identify zeros of polynomials given suitable factorizations

6. Write down the solutions to the equation $x(3x-1)(x+5)(x-1)=0$.

7. The polynomial p is a function of x. The graph of p has three zeros at 7, $\frac{2}{3}$, and -1. Select **all** the expressions that could represent p.

   (a) $(x-7)(x-\frac{2}{3})(x+1)$
   (b) $(x-7)(3x-2)(x-1)$
   (c) $3(x-7)(x-\frac{2}{3})(x+1)$
   (d) $3x(x+7)(x+\frac{2}{3})(x-1)^2$
   (e) $(x-7)(x+\frac{2}{3})(x-1)$
   (f) $(x-7)(3x-2)(x+1)$
   (g) $3(x-7)(x-\frac{2}{3})(x-1)$
   (h) $3x(x+7)(x-\frac{2}{3})(x+1)^2$

A2-A.APR.3 Rewrite rational expressions in different forms

8. Select the expression that is equivalent to $\dfrac{2x^2+11x-21}{x+3}$ for $x \neq -3$.

   (a) $2x+5-\dfrac{6}{x+3}$
   (b) $2x+17-\dfrac{20}{x+3}$
   (c) $2x+17-\dfrac{36}{x+3}$
   (d) $2x+5-\dfrac{36}{x+3}$

A2-A.SSE.3c Apply the properties of exponents

9. Identify the expressions that are equal to $\dfrac{3^3}{3^5}$

   (a) 3^{-2}
   (b) $\frac{1}{9}$
   (c) 3^3
   (d) 3^8
   (e) $\dfrac{1}{3^2}$
   (f) 0.111

10. Identify the expressions that are equal to 5^{-2}

    (a) $\dfrac{1}{5^2}$
    (b) 5.5
    (c) $\sqrt{5}$
    (d) $\dfrac{1}{25}$
    (e) 0.04
    (f) 10

11. Identify the expressions that are equal to $16^{\frac{1}{4}}$

    (a) 2
    (b) 4
    (c) $\sqrt{4}$
    (d) $\sqrt[4]{16}$
    (e) 16.25
    (f) 256

A2-F.BF.2 Write arithmetic and geometric sequences with recursive formulas

12. Write a recursive definition of the sequence $a_1 = 8$, $a_2 = 4$, $a_3 = 2$, $a_4 = 1, \ldots$

13. Write a recursive definition of the arithmetic sequence b.

n	b_n
1	-2
2	-0.5
3	1

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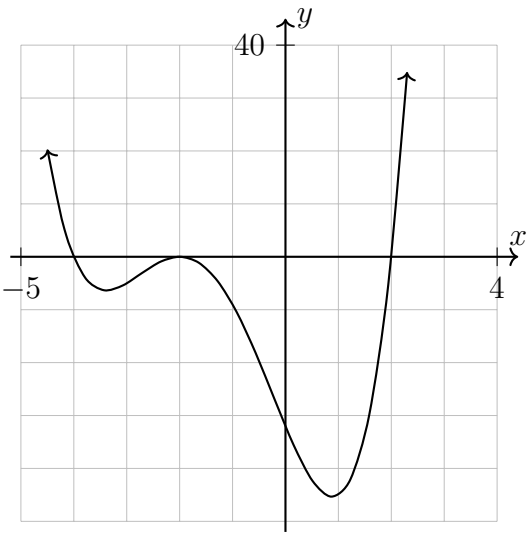
A2-F.IF.7c Graph polynomials, identify zeros, end behavior

14. Below is a graph of the polynomial $f(x)$.



(a) Is the leading coefficient positive or negative?

(b) Which of the following could be its equation?

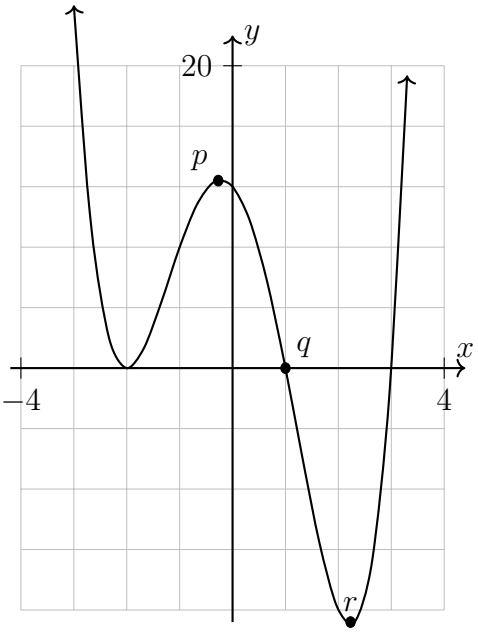
i. $f(x) = (x+2)(x-4)(x-2)^2$

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

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

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

15. The graph of the polynomial $f(x) = x^4 - 9x^2 - 4x + 12$ is shown.



(a) What is the degree of the function?

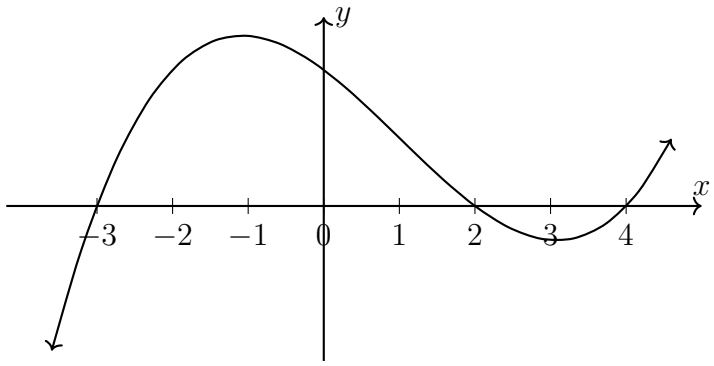
(b) What are the zeros of the function?

(c) Which factor has a multiplicity of 2?

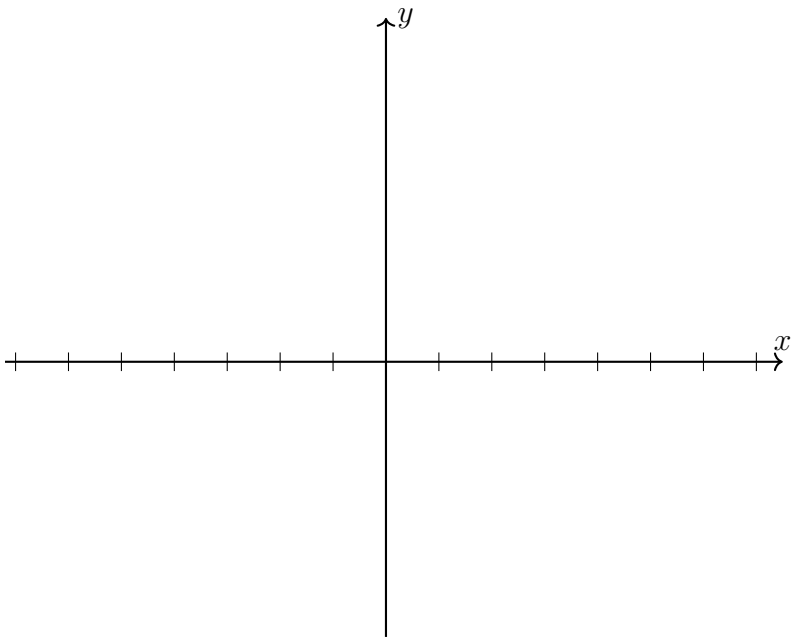
(d) Write down the y-intercept as an ordered pair.

(e) Three points are marked on the graph, p, q, and r. Which one is a local minimum?

16. The graph of the function $f(x) = x^3 - 3x^2 - 10x + 24$ is shown. Write the function in factored form.



17. Let $j(x) = (x + 4)(x + 1)(x - 4)^2$ be a polynomial function.



(a) Sketch a graph of the function. Label the x-intercepts.

(b) Find the value of the y-intercept and mark it on the graph.

(c) Identify the end behavior of the function.

i. As $x \to +\infty$, $y \to +\infty$;
as $x \to -\infty$, $y \to -\infty$

ii. As $x \to +\infty$, $y \to -\infty$;
as $x \to -\infty$, $y \to +\infty$

iii. As $x \to +\infty$, $y \to +\infty$;
as $x \to -\infty$, $y \to +\infty$

iv. As $x \to +\infty$, $y \to -\infty$;
as $x \to -\infty$, $y \to -\infty$

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6.EE.b Reason about and solve one-variable equations and inequalities

18. Use the function $f(x) = \frac{1}{2}x + 11$ to answer the questions.

    (a) Find the value of $f(4)$.

    (b) Solve for x if $f(x) = 2$.

19. Solve each equation for x.

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

    (b) $x^3 - 7x^2 + 6x = 0$

20. The expression $2 - \dfrac{x-1}{x+2}$ is equivalent to

    (a) $1 - \dfrac{3}{x+2}$

    (b) $1 + \dfrac{3}{x+2}$

    (c) $1 - \dfrac{1}{x+2}$

    (d) $1 + \dfrac{1}{x+2}$

21. Find all of the values of x that make the equation true.

$$\frac{3}{x-4} = \frac{x-5}{x}$$

22. Given the rational function $r(x) = 3 - \dfrac{x-1}{x+2}$.

    (a) Sketch a graph of the function.

    (b) Mark the vertical asymptote as dotted line and label it with its equation.

    (c) Explain why the asymptote is located there.