BECA / Huson / Algebra 2: Polynomials Jan 2023 Regents Name:
9 April 2024

Regents problems: Polynomials

1. Which expression is equivalent to $(x + 2)^2 - 5(x + 2) + 6$?

    (a) $x(x + 1)$

    (b) $(x - 3)(x + 2)$

    (c) $(x - 4)(x + 3)$

    (d) $(x - 6)(x + 1)$

2. The expression $\dfrac{x^4 - 5x^2 + 4x + 14}{x + 2}$ is equivalent to

    (a) $x^3 - 2x^2 - x + 6 - \dfrac{2}{x + 2}$

    (b) $x^3 - 5x + 4 - \dfrac{14}{x + 2}$

    (c) $x^3 + 2x^2 - x + 2 + \dfrac{18}{x + 2}$

    (d) $x^3 + 2x^2 - 9x + 22 - \dfrac{30}{x + 2}$

3. If $f(x) = 2x^4 - x^3 - 16x + 8$, then $f\left(\frac{1}{2}\right)$

    (a) equals 0 and $2x + 1$ is a factor of $f(x)$

    (b) equals 0 and $2x - 1$ is a factor of $f(x)$

    (c) does not equal 0 and $2x + 1$ is not a factor of $f(x)$

    (d) does not equal 0 and $2x - 1$ is a factor of $f(x)$

4. What is the solution set of the equation $\dfrac{x + 2}{x} + \dfrac{x}{3} = \dfrac{2x^2 + 6}{3x}$?

    (a) $\{-3\}$

    (b) $\{-3, 0\}$

    (c) $\{3\}$

    (d) $\{0, 3\}$

5. How many real solutions exist for the system of equations below?

$$y = \frac{1}{4}x - 8$$
$$y = \frac{1}{2}x^2 + 2x$$

   (a) 1

   (b) 2

   (c) 3

   (d) 0

6. Which equation represents a polynomial identity?

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

7. Given $f(x) = x^4 - x^3 - 6x^2$, for what values of x will $f(x) > 0$?

   (a) $x < -2$, only

   (b) $-2 < x$ or $x > 3$

   (c) $-2 < x$ or $0 \le x \le 3$

   (d) $x > 3$, only
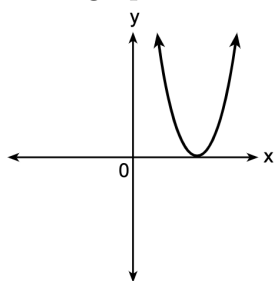
8. Consider a cubic polynomial with the characteristics below.

   • exactly one real root

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

   Given $a > 0$ and $b > 0$, which equation represents a cubic polynomial with these characteristics?
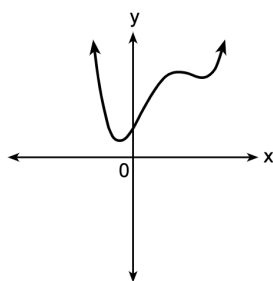
   (a) $f(x) = (x - a)(x^2 + b)$

   (b) $f(x) = (a - x)(x^2 + b)$

   (c) $f(x) = (a - x^2)(x^2 + b)$

   (d) $f(x) = (x - a)(b - x^2)$

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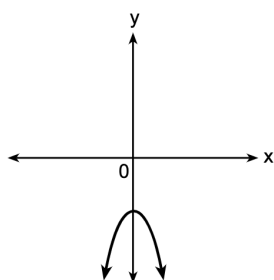9 April 2024

9. Which graph shows a quadratic function with two imaginary zeros?
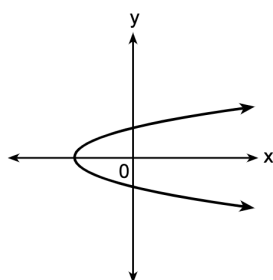

(1)

(3)

(2)

(4)

10. Algebraically determine the zeros of the function below.

$$r(x) = 3x^3 + 12x^2 - 3x - 12$$

11. Write the expression $A(x) \cdot B(x) - 3C(x)$ as a polynomial in standard form.

$$A(x) = x^3 + 2x - 1$$
$$B(x) = x^2 + 7$$
$$C(x) = x^4 - 5x$$

12. Over the set of integers, completely factor $x^4 - 5x^2 + 4$.