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 $0 \leq x \leq 3$

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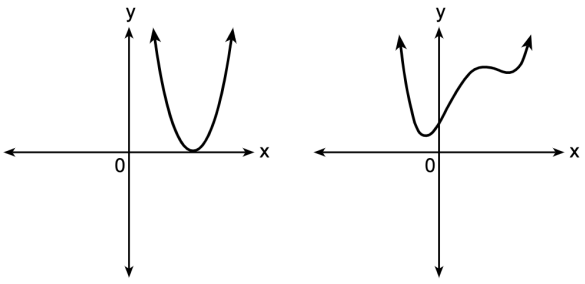
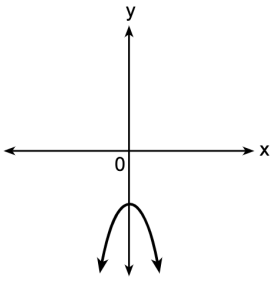
9. Which graph shows a quadratic function with two imaginary zeros?

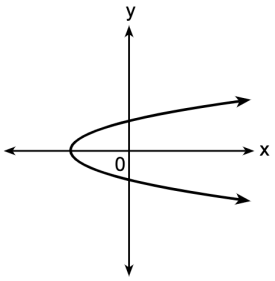


(1)

(3)



(2)



(4)

10. Algebraically determine the zeros of the function below. $r(x)3x3112x223x212$