

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

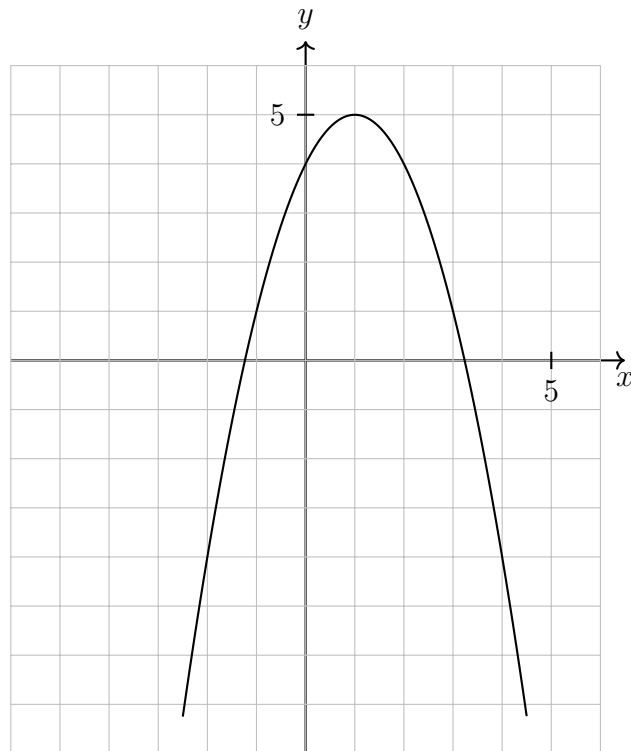
**Regents problems: Polynomials**

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  $\frac{x^4 - 5x^2 + 4x + 14}{x + 2}$  is equivalent to
  - (a)  $x^3 - 2x^2 - x + 6 + \frac{2}{x + 2}$
  - (b)  $x^3 - 5x + 4 - \frac{14}{x + 2}$
  - (c)  $x^3 + 2x^2 - x + 2 + \frac{18}{x + 2}$
  - (d)  $x^3 + 2x^2 - 9x + 22 - \frac{30}{x + 2}$
  
3. Given  $x \neq -3$ , which expression is equivalent to  $\frac{2x^3 + 3x^2 - 4x + 5}{x + 3}$ ?
  - (a)  $2x^3 + 9x^2 + 23x + 74$
  - (b)  $2x^2 - 3x + 5 - \frac{10}{x + 3}$
  - (c)  $2x^3 - 3x^2 + 5x - 10$
  - (d)  $2x^3 + 9x + 23 + \frac{74}{x + 3}$
  
4. 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  $f(x)$
  
5. What is the solution set of the equation  $\frac{x + 2}{x} + \frac{x}{3} = \frac{2x^2 + 6}{3x}$ ?

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- (a)  $\{-3\}$
- (b)  $\{-3, 0\}$
- (c)  $\{3\}$
- (d)  $\{0, 3\}$

6. The graph of a quadratic function is shown below.



Then the graph of  $x + y = 4$  is drawn on the same axes, one solution to this system is

- (a)  $(4, 0)$
- (b)  $(1, 5)$
- (c)  $(2, 2)$
- (d)  $(3, 1)$

7. 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

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(b) 2

(c) 3

(d) 0

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

9. 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

10. Consider a cubic polynomial with the characteristics below.

- exactly one real root
- as  $x \rightarrow \infty$ ,  $f(x) \rightarrow -\infty$

Given  $a > 0$  and  $b > 0$ , which equation represents a cubic polynomial with these characteristics?

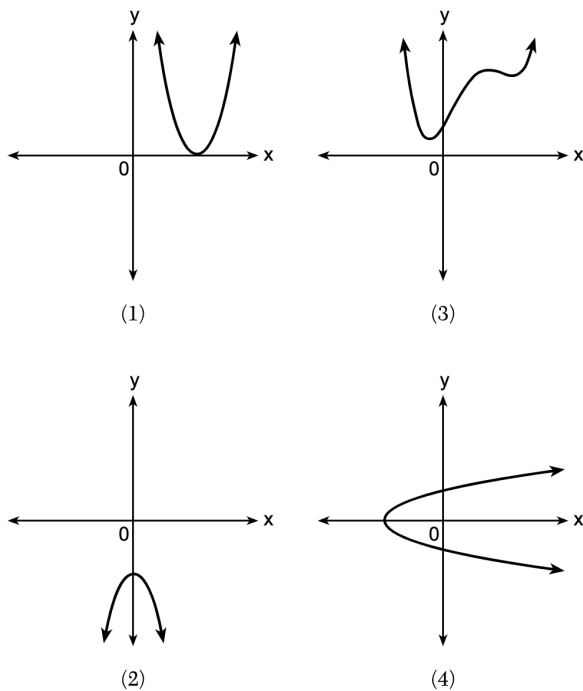
(a)  $f(x) = (x - a)(x^2 + b)$

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

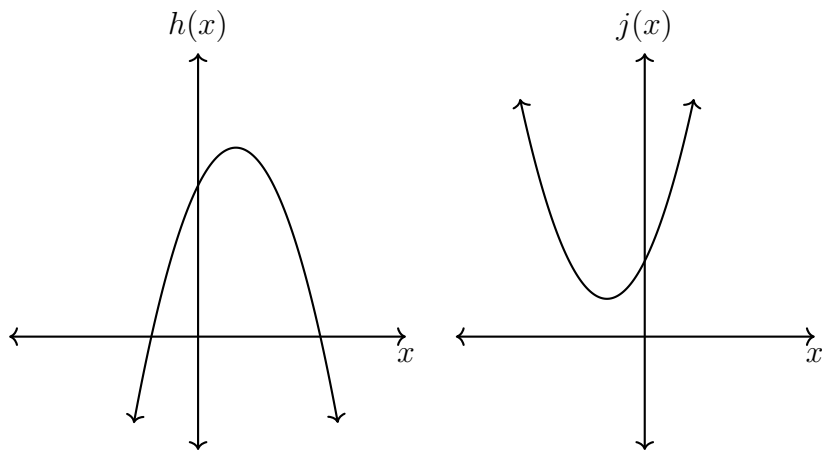
(c)  $f(x) = (a - x^2)(x^2 + b)$

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

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



12. In the quadratic formula,  $b^2 - 4ac$  is called the discriminant. The function  $f(x)$  has a discriminant value of 8, and  $g(x)$  has a discriminant value of  $-16$ . The quadratic graphs,  $h(x)$  and  $j(x)$ , are shown below.



Which quadratic functions have imaginary roots?

- (a)  $g(x)$  and  $h(x)$
- (b)  $g(x)$  and  $j(x)$
- (c)  $f(x)$  and  $h(x)$
- (d)  $f(x)$  and  $j(x)$

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13. Algebraically determine the zeros of the function below.

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

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

$$A(x) = x^3 + 2x - 1$$

$$B(x) = x^2 + 7$$

$$C(x) = x^4 - 5x$$

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