

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. 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  $\frac{x + 2}{x} + \frac{x}{3} = \frac{2x^2 + 6}{3x}$ ?

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

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