$\rm BECA$ / 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 $f(\frac{1}{2})$
 - (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 $\frac{x+2}{x} + \frac{x}{3} = \frac{2x^2+6}{3x}$?

- (a) $\{-3\}$
- (b) $\{-3,0\}$
- (c) $\{3\}$
- (d) $\{0,3\}$
- 6. The graph of a quadratic function is shown below. [graph] 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
- (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 $0 \le x \le 3$
 - (d) x > 3, only

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- 10. 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?

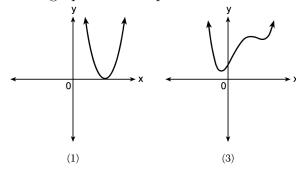
(a)
$$f(x) = (x - a)(x^2 + b)$$

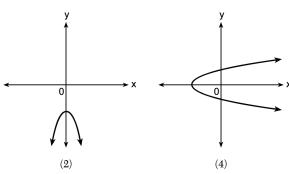
(b)
$$f(x) = (a-x)(x^2+b)$$

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

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

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





12. Algebraically determine the zeros of the function below.

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

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

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

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

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

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