BECA / Huson / Algebra 2: Exponentials Jan 2023 RegentsName:
4 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. To the *nearest tenth*, the solution to the equation $4300e^{0.07x} - 123 = 5000$ is
   (a) 1.1
   (b) 2.5
   (c) 6.3
   (d) 68.5

3. The value of an automobile t years after it was purchased is given by the function $V = 38000(0.84)^t$. Which statement is true?
   (a) The value of the car increases 84% each year.
   (b) The value of the car decreases 84% each year.
   (c) The value of the car increases 16% each year.
   (d) The value of the car decreases 16% each year.

4. Which function represents exponential decay?
   (a) $p(x) = \left(\frac{1}{4}\right)^x$
   (b) $q(x) = 1.8^{-x}$
   (c) $r(x) = 2.3^{2x}$
   (d) $s(x) = 4^{\frac{x}{2}}$

5. 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) $x^3 + 2x^2 - 9x + 22 - \dfrac{30}{x+2}$

6. The sum of the first 20 terms of the series $2 - 6 + 18 - 54 + \ldots$ is

   (a) -610

   (b) -59

   (c) 1,743,392,200

   (d) 2,324,522,934

7. 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 $f(x)$

8. If $(6 - ki)^2 = 27 - 36i$, the value of k is

   (a) -36

   (b) -3

   (c) 3

   (d) 6

9. 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) $\{0, 3\}$

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10. 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

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

12. Given $x > 0$, the expression $\frac{1}{x^2-1}$ can be rewritten as

(a) $\frac{3}{x} - 1$

(b) $\frac{2}{10x^3}$

(c) $\frac{10}{x^3}$

(d) $\frac{3}{x^{10}}$

13. Given $x > 0$, the expression $\frac{1}{\sqrt[3]{x^2}-1}$ can be rewritten as

(a) $\frac{1}{\sqrt[3]{x}-1}$

(b) $\frac{1}{\sqrt[3]{x}+1}$

(c) $\frac{1}{\sqrt{x}-1}$

(d) $\frac{1}{\sqrt{x}+1}$