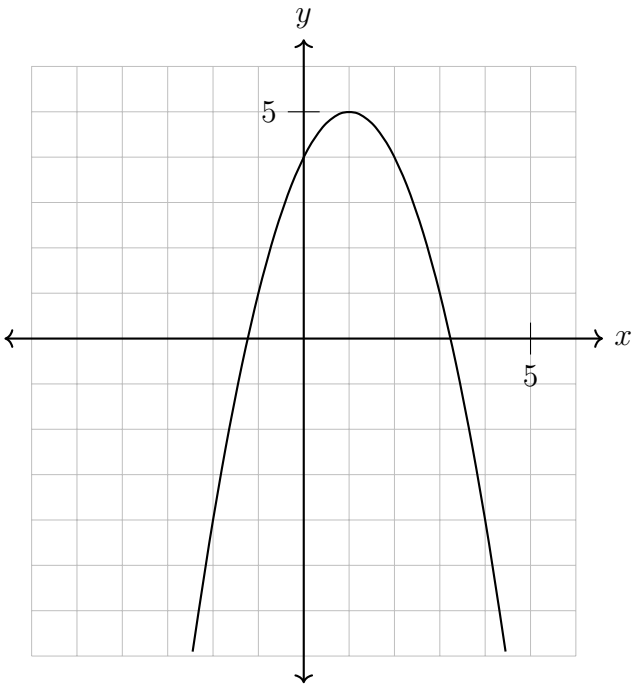
BECA / Huson / Algebra 2: Polynomials Name:
4 November 2023

Regents problems: Polynomials

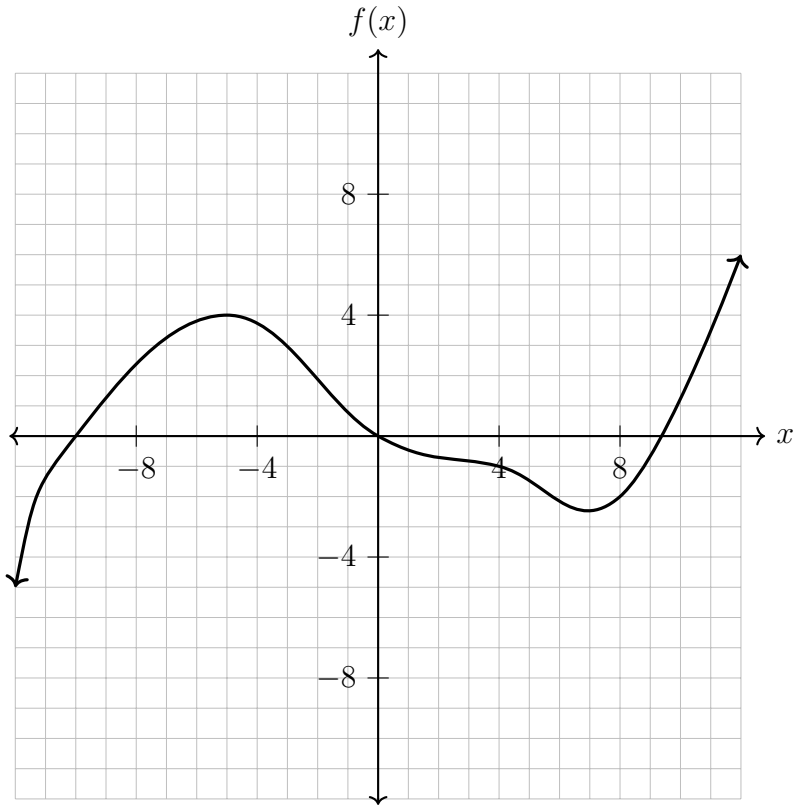
1. The graph of a quadratic function is shown below.



When 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) $(3, 1)$

2. The graph of the function $f(x)$ is shown below.



In which interval is $f(x)$ always positive?

(a) $(-2, 4)$

(b) $(0, 10)$

(c) $(-12, -5)$

(d) $(-10, 0)$

3. Stone Manufacturing has developed a cost model, $C(x) = 0.18x^3 + 0.02x^2 + 4x + 180$, where x is the number of sprockets sold, in thousands. The sale price can be modeled by $S(x) = 95.4 - 6x$ and the company's revenue by $R(x) = x \cdot S(x)$. The company profits, $R(x) - C(x)$, could be modeled by

   (a) $0.18x^3 + 6.02x^2 + 91.4x + 180$

   (b) $0.18x^3 - 5.98x^2 - 91.4x + 180$

   (c) $0.18x^3 - 6.02x^2 + 91.4x - 180$

   (d) $0.18x^3 + 5.98x^2 + 99.4x + 180$

4. The graph of a cubic polynomial function $p(x)$ is shown below.

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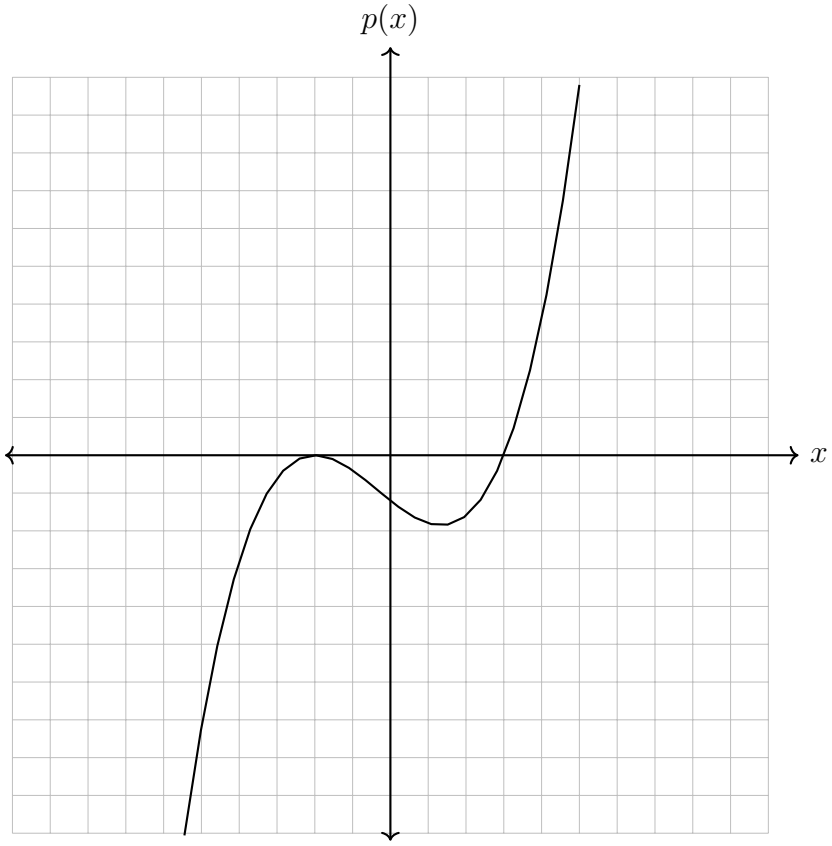

If $p(x)$ is written as a product of linear factors, which factor would appear twice?

(a) $x - 2$

(b) $x + 2$

(c) $x - 3$

(d) $x + 3$

5. Factor the expression $2x^3 - 3x^2 - 18x + 27$ completely.

6. Algebraically determine the values of x that satisfy the system of equations shown below:

$$y = x^2 + 8x - 5$$
$$y = 8x - 4$$

7. Evaluate each polynomial for the given value of x.

   (a) $f(x) = -x^3 + 12x^2 - x + 4$, $x = 0$
   $f(0) =$

   (b) $g(x) = 2x^3 + 11x^2 - 3x + 15$
   $g(-8) =$

8. The polynomial function A, shown below, is used to model the value of an investment account. Three deposits were made which earned interest annually.

$$A(x) = 200x^5 + 300x^4 + 150x^3$$

   (a) How much was the first deposit, and how long ago was it made?

   (b) If the polynomial is evaluated for $x = 1.04$, what interest rate would that represent *as a percentage*?

   (c) Find the value of $A(1.04)$ to the *nearest cent*.

A2-F.BF.2 Write arithmetic and geometric sequences with recursive formulas

9. Write a recursive formula for each sequence. Use subscript notation.

   (a) $3, -6, 12, -24, 48, \ldots$

   (b) $\frac{3}{4}, \frac{5}{4}, \frac{7}{4}, \frac{9}{4}, \ldots$

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A1-A.APR.1 Add, subtract, and multiply polynomials

10. Find the sum in standard form $(x^3 - 4x^2 + 2x + 16) + (5x^3 - 2x^2 - 3x - 12)$

11. Find the difference $f(x) - g(x)$ as a polynomial in standard form, given $f(x) = x^4 + 2x^3 - x - 9$ and $g(x) = 2x^3 + x^2 - 3x - 11$.

12. Multiply the two polynomials $f(x) = 3x - 2$ and $g(x) = x^2 - 5x + 4$. First complete the grid and then collect terms to find the product as a polynomial in standard form.

	x^2	$-5x$	4
$3x$			
-2			

13. Select all of the expressions that are equivalent to $x^2 - 5x + 6$.

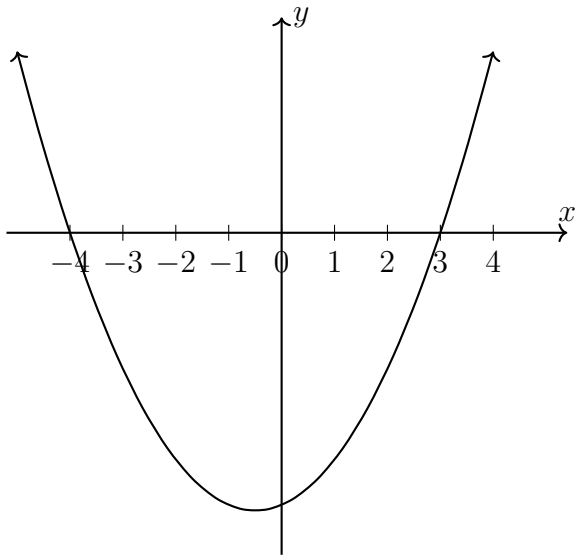
(a) $(x - 2)(x + 3)$
(b) $(x - 3)(x - 2)$
(c) $(x - 5)(x + 6)$
(d) $(x + 2)(x - 3)$
(e) $(x - 6)(x + 5)$
(f) $(x + 3)(x + 2)$
(g) $(x - 2)(x - 3)$
(h) $x^2 + 5x + 6$

A1-A.APR.3 Identify zeros of polynomials when factorizations are available.

14. Select all solutions to the equation $(x-3)(2x+1)=0$.

    (a) $x=-\frac{1}{2}$
    (b) $x=3$
    (c) $x=-2$
    (d) $x=-0.5$
    (e) $x=-3$
    (f) $x=\frac{1}{2}$

15. Here is the graph of a quadratic function. Which of the following could be its equation?



    (a) $y=(x+3)(x-4)$
    (b) $y=(x-3)(x+4)$
    (c) $y=(x+3)(x+4)$
    (d) $y=(x-3)(x-4)$

16. Find all of the values of x that make the equation true, the solutions.

    $x(x+5)(2x-9)(x-13)=0$.

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17. Given the polynomial function $f(x) = 2x^4 + 5x^3 - x^2 + 3x - 6$.
    (a) What is the degree of the polynomial?

    (b) Write down the leading coefficient of f.

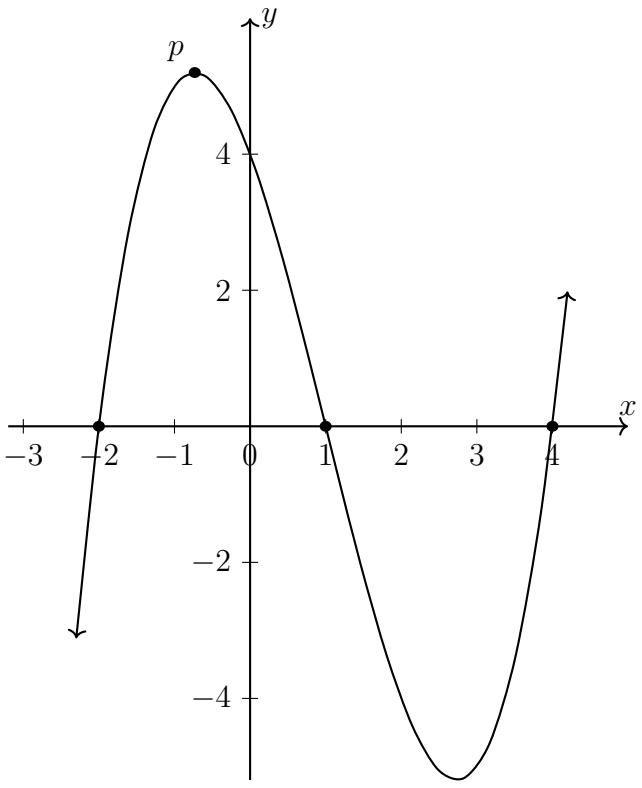
    (c) What is the value of the constant term?

    (d) Find $f(1)$.

18. The graph of a polynomial function is shown below.
    (a) Write down the x-intercepts, the solutions to $f(x) = 0$.

    (b) Write down the y-intercept as an ordered pair.

    (c) What term do we use to describe the point p on the plot?



19. graph - ChatGPT (?)