

2.12 Trimester Exam: Polynomial functions

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

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

(a) $f(x) = x^3 + 2x^2 - 7x + 8$

$f(0) = 8$

(b) $g(x) = 5x^2 - 3x + 11$

$g(1) = 13$

2. Find the sum in standard form $(3x^3 + 2x^2 - 9x + 1) + (x^3 + 4x^2 - x - 7)$

$$4x^3 + 6x^2 - 10x - 6$$

3. Find the difference $f(x) - g(x)$ as a polynomial in standard form, with

$f(x) = 7x^3 - 3x + 5$ and $g(x) = x^3 - 2x^2 - 1$.

$$6x^3 + 2x^2 - 3x + 6$$

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

	x^2	$-3x$	$+5$
$2x^2$	$2x^4$	$-6x^3$	$+10x^2$
$+4$	$+4x^2$	$-12x$	$+20$

$$= 2x^4 - 6x^3 + 14x^2 - 12x + 20$$

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

5. Select all solutions to the equation $(x - 6)(2x + 6) = 0$.

☒ (a) $x = -3$

(c) $x = \frac{1}{6}$

(e) $x = -6$

☒ (b) $x = 6$

(d) $x = -\frac{1}{3}$

☒ (f) $x = -\frac{6}{2}$

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

(a) $(x - 2)(x + 3)$

☒ (d) $(x + 2)(x - 3)$

(b) $(x - 2)(x - 3)$

(e) $(x + 2)(x + 3)$

(c) $(x - 1)(x + 6)$

(f) $x^2 + x + 6$

7. Write down the solutions to the equation $x(x - 5)(3x - 9)(x + 1) = 0$.

$0, 5, +3, -1$

8. Identify all of the polynomials having zeros of $x = 0, -2, 4, 7$.

(a) $2(x - 2)(x + 4)(x + 7)$

(d) $2(x + 2)(x - 4)(x - 7)$

(b) $2x(x - 2)(x + 4)(x + 7)$

☒ (e) $x^2(x + 2)(x - 4)(x - 7)$

(c) $x(x - 2)(x + 4)(x + 7)$

☒ (f) $(x + 3)(x + 2)$

A2-F.IF.7c Graph polynomials, identify zeros, end behavior

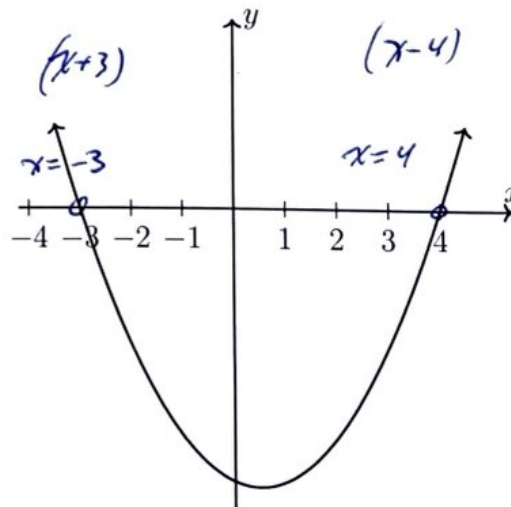
9. Here is the graph of a quadratic function. Which of the following could be its equation?

☒ (a) $y = (x + 3)(x - 4)$

(b) $y = (x - 3)(x + 4)$

(c) $y = (x + 3)(x + 4)$

(d) $y = (x - 3)(x - 4)$



10. Given $f(x) = x(x-3)(x+7)(x+11)$. Select the true statements.

- (a) $f(3) = 0$
 (b) f is a 4th degree polynomial.
 (c) One of the roots of f is 7. *X*
 (d) An ordered pair satisfying the equation is $(-11, 0)$
 (e) $f(0) = 0$

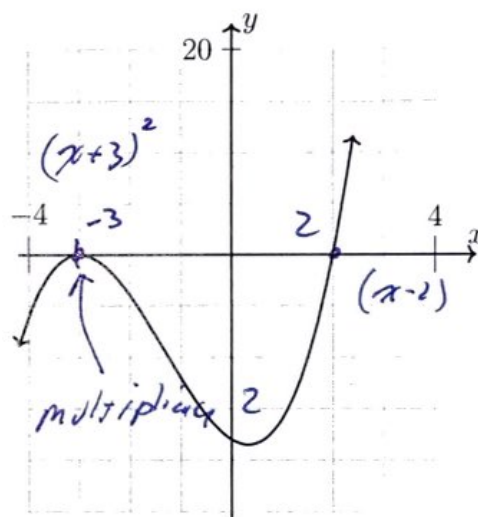
11. Below is a graph of the polynomial $f(x)$.

What is the degree of the function?

3

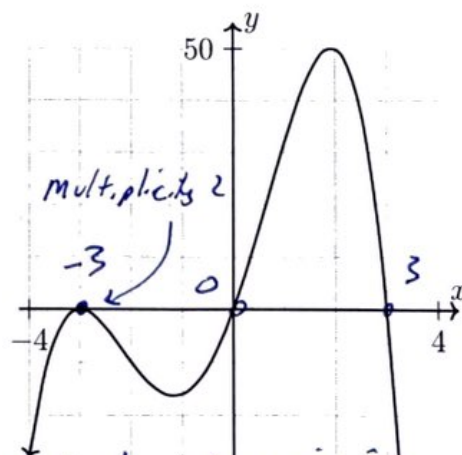
Which of the following could be its equation?

- (a) $f(x) = (x+2)(x-3)^2$
 (b) $f(x) = (x-2)(x+3)^2$
 (c) $f(x) = (x+3)(x-2)^2$
 (d) $f(x) = (x-3)(x+2)^2$



12. The polynomial $g(x) = -x^4 - 3x^3 + 9x^2 + 27x$ is graphed below.

- (a) What is the leading coefficient?
-1
 (b) What are roots of the function?
-3, 0, 3
 (c) What factor has a multiplicity of 2?
(x+3)
 (d) Write down the y-intercept as an ordered pair.
(0, 0)
 (e) What is the end behavior?



*x → +∞
 y → -∞
 x → -∞
 y → -∞*

*as x grows without bound positively
 y grows without bound negatively
 as x grows without bound negatively
 y grows without bound negatively*

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

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

(a) $1, 3, 5, 7, 9, \dots$

$$a_1 = 1$$

$$a_n = a_{n-1} + 2$$

(b) $+\frac{3}{1}, -\frac{3}{2}, +\frac{3}{4}, -\frac{3}{8}, \dots$

$$a_1 = \frac{3}{1}$$

$$a_n = a_{n-1} \times \left(-\frac{1}{2}\right)$$

14. Write a recursive definition of the arithmetic sequence a .

n	a_n
1	8
2	-2
3	-12

$$a_1 = 8$$

$$a_n = a_{n-1} - 10$$

$\times 3, r=3$

15. Write a recursive definition of the geometric sequence $a_1 = 1, \dots, a_3 = 9, a_4 = 27, \dots$

$$a_1 = 1$$

$$a_n = 3a_{n-1}$$

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

$$A(x) = 300x^4 + 100x^3 + 250x^2$$

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

\$300

4 years ago

(b) If the polynomial is evaluated for $x = 1.06$, what interest rate would that represent as a percentage?

\$ 6%

(c) Find the value of $A(1.06)$ to the nearest cent.

$$A(1.06) = 778,744.688\dots$$

$$\approx \$778.74$$