



Math Virtual Learning

Algebra 2A

Polynomial Synthetic Division

April 22, 2020



Lesson:

Polynomial Synthetic Division

Learning Target:

LT D2 I can perform polynomial division (long and synthetic) and apply the remainder theorem.

LT D3 I can evaluate and compose polynomial functions.

Objective:

Students will be able to evaluate polynomials. Students will be able to apply the remainder theorem.

Warm Up

For today's warm up, try the practice problems below:

$$f(x) = 2x + 3$$

$$g(x) = 5x - 4$$

1. $(f + g)(x)$
2. $(f - g)(x)$
3. $(fg)(x)$

Warm Up Answers

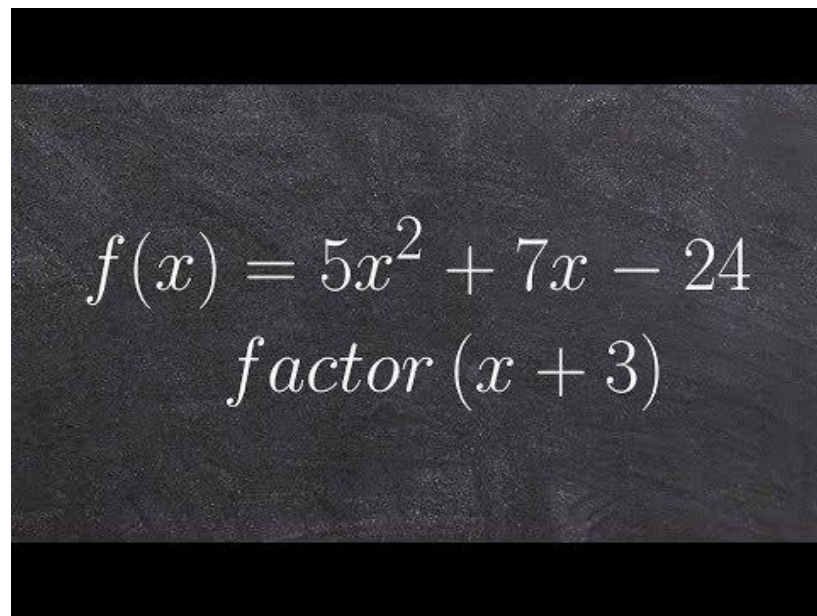
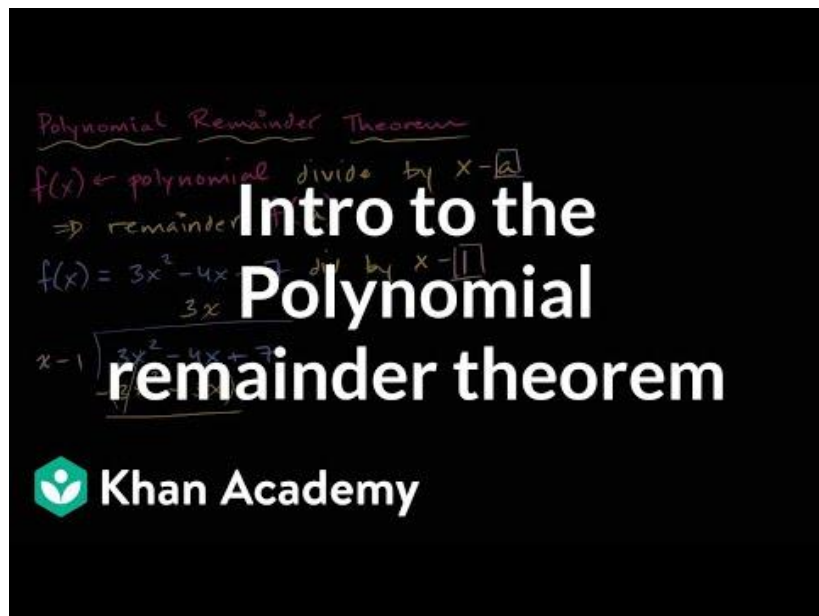
1. $(f+g)(x) = 7x - 1$

2. $(f - g)(x) = -3x + 7$

3. $(fg)(x) = 10x^2 + 7x - 12$

Lesson

You will need to watch the two videos below:



Lesson

Things to remember about the remainder theorem:

1. Only works with when the divisor is a linear expression of the form $\mathbf{x-a}$, with \mathbf{a} being some number.
2. You can divide the polynomial using either long division or synthetic division.

Practice

Use synthetic division and the remainder theorem to evaluate each of these problems.

Find $f(3)$ for the equation $f(x) = x^3 - 3x^2 + 2x + 5$

Find $g(4)$ for the equation $g(x) = 2x^3 - 5x^2 + 3x - 4$

Find $h(-1)$ for the equation $h(x) = x^4 - 4x^2 + 2x + 5$

Find $q(0)$ for the equation $q(x) = 5x^4 - 3x^3 + 7x^2 + 2x + 8$

Find $f(3)$ for the equation $f(x) = x^3 - 3x^2 + 2x + 5$

$$\begin{array}{r} \underline{3 \mid 1 \quad -3 \quad 2 \quad 5} \\ \downarrow \quad 3 \quad 0 \quad 6 \\ 1 \quad 0 \quad 2 \quad \textcircled{11} \end{array}$$

↑
remainder

Check

$$\begin{aligned} f(3) &= (3)^3 - 3(3)^2 + 2(3) + 5 \\ &= 27 - 27 + 6 + 5 \\ &= 11 \end{aligned}$$

Answer: $f(3) = 11$

Find $g(4)$ for the equation $g(x) = 2x^3 - 5x^2 + 3x - 4$

$$\underline{4} \mid 2 \quad -5 \quad 3 \quad -4$$

$$\downarrow \quad 8 \quad 12 \quad 60$$

$$2 \quad 3 \quad 15 \quad (56)$$

remainder

$$g(4) = 2(4)^3 - 5(4)^2 + 3(4) - 4$$

$$= 128 - 80 + 12 - 4$$

$$= 56$$

$$\boxed{\text{Answer: } g(4) = 56}$$

Find $h(-1)$ for the equation $h(x) = x^4 - 4x^2 + 2x + 5$

-11 1 0 -4 2 5

↓ -1 1 3 -5

1 -1 -3 5 0

remainder

$$h(-1) = (-1)^4 - 4(-1)^2 + 2(-1) + 5$$

$$= 1 - 4 - 2 + 5$$

$$= 0$$

Answer: $h(-1) = 0$

Find $q(0)$ for the equation $q(x) = 5x^4 - 3x^3 + 7x^2 + 2x + 8$

$$\underline{0} \mid 5 \quad -3 \quad 7 \quad 2 \quad 8$$

$$\downarrow \quad 0 \quad 0 \quad 0 \quad 0$$

$$5 \quad -3 \quad 7 \quad 2 \quad \textcircled{8}$$

remainder

$$q(0) = 5(0)^4 - 3(0)^3 + 7(0)^2 + 2(0) + 8$$
$$= 8$$

Answer : $q(0) = 8$

Solutions to Practice Problems

$$f(3) = 11$$

$$g(4) = 56$$

$$h(-1) = 0$$

$$q(0) = 8$$

Additional Resources

[The Remainder Theorem](#)

[Remainder Theorem and Factor Theorem](#)

Additional Practice

[Khan Academy-Remainder theorem](#)

[Kuta-The Remainder Theorem](#)