

Name
Date
Course

Polynomials (Part III): Long Division and Synthetic Division (Homework)

Use long division to divide the following polynomials.

① $(3x^4 + 19 - 4x^3) \div (x^2 + 10 - 2x)$

② $(4x^2 - 5x^5 + 1) \div (x^2 + 1)$

③ $(8x^3 + 32x^2 + 4x) \div (2x + 5)$

④ $(x^4 + 10) \div (x - 6)$

⑤ $-2x^4 \div (x + 3)$

Divide the following polynomials using synthetic division.

⑥ $(x^4 + 2x^3 - 17x^2 - 18x + 72) \div (x + 3)$

⑦ $(2x^3 - 3x^2 - 12x + 20) \div (x - 2)$

⑧ $(10x^5 - 21x^4 + x^3 - x^2 + 15x - 4) \div (2x + 10)$

⑨ $(4x^4 + 5x^3 - 26x^2 - 9x + 18) \div (x - 2)$

⑩ $(-x^5 + 2x^2 + 100) \div (x + 1)$

⑪ $(x^4 - 3) \div (x + 4)$

⑫ $(19x^3 + x - 16) \div (3 - x)$

⑬ $(5x^4 + 10x - 9x^2 + 14) \div (1 + x)$

⑭ $(x^4 + 50x + 2x^2) \div (x + 3)$

⑮ $(8 - 4x^3 + x^5) \div (-2 + x)$

⑯ $(2x^6 - 1 + 17x^3 + 4x) \div (-x + 7)$

⑰ $(x^7 + 4x - 8) \div (-2x^2 + 5)$

⑱ $(x + x^5 - 4 - x^4 - 6x^3) \div (x - 1)$

⑲ $(-3x^4 + 2 - 24x) \div (x + 2)$

⑳ $(x^6 + 44x - 15x^4 + 1) \div (4 + x)$

㉑ $(x^4 + 2x^3 - x^2 + 19x - 8) \div (x + 4)$

㉒ $(-3x^2 + 2x^3) \div (x - 5)$

Answers

$$\textcircled{1} \quad 3x^2 + 2x - 26 + \frac{-72x + 279}{x^2 - 2x + 10}$$

$$\textcircled{2} \quad -5x^3 + 5x + 4 + \frac{-5x - 3}{x^2 + 1} \quad \text{or} \quad -5x^3 + 5x + 4 - \frac{5x + 3}{x^2 + 1}$$

$$\textcircled{3} \quad 4x^2 + 6x - 13 + \frac{65}{2x + 5}$$

$$\textcircled{4} \quad x^3 + 6x^2 + 36x + 216 + \frac{1306}{x - 6}$$

$$\textcircled{5} \quad -2x^3 + 6x^2 - 18x + 54 - \frac{162}{x + 3}$$

$$\textcircled{6} \quad x^3 - x^2 - 14x + 24$$

$$\textcircled{7} \quad 2x^2 + x - 10$$

$$\textcircled{8} \quad \text{Cannot use synthetic division}$$

$$\textcircled{9} \quad 4x^3 + 13x^2 - 9$$

$$\textcircled{10} \quad -x^4 + x^3 - x^2 + 3x - 3 + \frac{103}{x + 1}$$

$$\textcircled{11} \quad x^3 - 4x^2 + 16x - 64 + \frac{252}{x + 4}$$

$$\textcircled{12} \quad \text{Cannot use synthetic division.}$$

$$\textcircled{13} \quad 5x^3 - 5x^2 - 4x + 14$$

$$\textcircled{14} \quad x^3 - 3x^2 + 11x + 17 - \frac{51}{x + 3}$$

$$\textcircled{15} \quad x^4 + 2x^3 + \frac{8}{x - 2}$$

$$\textcircled{16} \quad \text{Cannot use synthetic division}$$

$$\textcircled{17} \quad \text{Cannot use synthetic division}$$

$$\textcircled{18} \quad x^4 - 6x^2 - 6x - 5 - \frac{9}{x - 1}$$

$$\textcircled{19} \quad -3x^3 + 6x^2 - 12x + \frac{2}{x + 2}$$

$$\textcircled{20} \quad x^5 - 4x^4 + x^3 - 4x^2 + 16x - 20 + \frac{81}{x + 4}$$

$$\textcircled{21} \quad x^3 - 2x^2 + 7x - 9 + \frac{28}{x + 4}$$

$$\textcircled{22} \quad 2x^2 + 7x + 35 + \frac{175}{x - 5}$$