Answer on Question #57266 – Math – Algebra

Question

Divide using long division $\frac{4x^4-5x^3+2x^2-x+5}{x^2+x+1}$

Solution

$$\frac{4x^4-5x^3+2x^2-x+5}{x^2+x+1} = \frac{4x^2(x^2+x+1)-9x^3-2x^2-x+5}{x^2+x+1} = 4x^2+\frac{-9x^3-2x^2-x+5}{x^2+x+1} =$$

$$= 4x^2+\frac{-9x(x^2+x+1)+7x^2+8x+5}{x^2+x+1} = 4x^2-9x+\frac{7x^2+8x+5}{x^2+x+1} =$$

$$=4x^2-9x+\frac{7(x^2+x+1)+x-2}{x^2+x+1} = 4x^2-9x+7+\frac{x-2}{x^2+x+1}.$$

Answer: $4x^2-9x+7+\frac{x-2}{x^2+x+1}$.

Question

Divide using synthetic division $\frac{16x^3+80x^2+x+5}{x+5}$

Solution

The polynomial in the denominator has a leading coefficient of 1, so we leave the binomial as $x - a$.

Set the denominator equal to zero to find the number a.

$x+5=0$

$x=-5$

Write the value of -5 , and write all the coefficients of the polynomial in a horizontal line to the left of -5 .

-5	16	80	1	5
	↓	-80	0	-5
	16	0	1	0

Draw a blue line below the coefficients, leaving room above the line.

Bring the first coefficient below the line.

Multiply the number below the line by -5 and write the result above the line below the next coefficient:

Subtract the result from the coefficient above it.

$80+(-5)\cdot 16 = 80 - 80 = 0$

Repeat steps until trying all the coefficients:

$1+(-5)\cdot 0 = 1 - 0 = 1$

$5+(-5)\cdot 1 = 5 - 5 = 0$

If the polynomial has 4 terms, the first 3 numbers below the line are the coefficients of the resulting polynomial, and the last number is the remainder.

We get $\frac{16x^3+80x^2+x+5}{x+5} = 16x^2 + 1.$

Answer: $16x^2 + 1.$