

Synthetic Division Review

To divide synthetically:

1. The divisor must be a binomial that can be written $x - c$. Only c is used from the divisor.
2. The dividend must be written with powers of the variable in descending order. Only coefficients of the dividend are used and zero (0) is used as a placeholder for any missing variable term or constant.

The following is an example that demonstrates how to write the problem to divide synthetically.

$$(x^3 + 4x^2 - 8) / (x + 4)$$

$x + 4$ is the divisor	$-4 \overline{)}$	1	4	0	-8	\leftarrow Dividend
	\uparrow		-4	0	0	
	Divisor	1	0	0	-8	\leftarrow (-8) Remainder
		\uparrow	\uparrow	\uparrow		
		Quotient				

We now outline the actual sequence of steps involved when using synthetic division to solve $(2x^3 + 3x^2 - 4x + 8) / (x + 3)$

First, show the divisor and the dividend:

$$-3 \overline{) 2 \ 3 \ -4 \ 8}$$

Next, "bring down" the first coefficient of the dividend:

$$\begin{array}{r}
 -3 \overline{) 2 \ 3 \ -4 \ 8} \\
 \underline{ 2} \\
 0
 \end{array}$$

Use synthetic division to perform the indicated division. Write the answer by stating the quotient, $Q(x)$, and the remainder $R(x)$.

Answers:

1. $(4x^3 - 10x^2 - 11x + 16) / (x - 4)$

2. $(x^3 - 2x + 1) / (x + 1)$

3. $(x^3 - 2x + 1) / (x - 1)$

4. $(2x^4 + 2x^3 - 12x^2 + x + 6) / (x + 3)$

5. $(x^3 - 5x^2 - 13x - 1) / (x - 7)$

6. $(x^3 - 1) / (x - 1)$

7. $(x^5 + 5x^2 + x + 2) / (x + 1)$

8. $(x^4 + x^2) / (x - 2)$

9. $(x^2 + 7x + 13) / (x + 4)$

1. $4x^2 + 6x + 13 + 68/(x - 4)$

2. $x^2 - x - 1 + 2/(x + 1)$

3. $x^2 + x - 1$

4. $2x^3 - 4x^2 + 1 + 3/(x + 3)$

5. $x^2 + 2x + 1 + 6/(x - 7)$

6. $x^2 + x + 1$

7. $x^4 - x^3 + x^2 + 4x - 3 + 5/(x + 1)$

8. $x^3 + 2x^2 + 5x + 10 + 20/(x - 2)$

9. $x + 3 + 1/(x + 4)$