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.

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

$$(1x^{3} + 4x^{2} + 0x - 8)$$

$$(1x^{3} + 1x^{2} + 0x - 8)$$

$$(1x^{3} + 1x^{2} + 0x - 8)$$

$$(1x^{3} + 1x^{2} + 0x - 8)$$

$$(1x^{3} +$$

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:

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

$$-3 \downarrow 2 3 -4 8$$

 $\downarrow 2$

Continue following a similar pattern:

Continue:

The quotient is read using the numbers in the final row as coefficients and by lowering the highest exponential power of the original dividend by one. $Q(x) = 2x^2 + 3x + 5$

The remainder is the last digit in the final row: R(x) = -7The remainder is expressed as a numerator with the divisor as the denominator. Example: -7 / (x + 3)

The final answer is: $2x^2 + 3x + 5 - 7/(x + 3)$

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