Honors Algebra II/Trig
Long and Synthetic Division

Name Key

Divide using long division.

1. $\dfrac{2x^3-3x^2+7x-3}{2x-1}$

$$2x-1 \overline{)\,2x^3-3x^2+7x-3}$$

x^2-x+3

$-(2x^3-x^2)$

$-2x^2+7x$

$-(-2x^2+x)$

$6x-3$

$-(6x-3)$

0

$$x^2-x+3$$

2. $\dfrac{x^3+3x^2+3x+1}{x^2+2x+1}$

$$x^2+2x+1 \overline{)\,x^3+3x^2+3x+1}$$

$x+1$

$-(x^3+2x^2+x)$

x^2+2x+1

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

0

$$x+1$$

3. $\dfrac{x^4+x^2+1}{x^2-x+1}$

$$x^2-x+1 \overline{)\,x^4+0x^3+x^2+0x+1}$$

x^2+x+1

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

x^3+0x^2+0x

$-(x^3-x^2+x)$

x^2-x+1

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

0

$$x^2+x+1$$

4. $\dfrac{x^4+7x^3+5x^2-8x-14}{x+6}$

$$x+6 \overline{)\,x^4+7x^3+5x^2-8x-14}$$

$x^3+x^2-x-2-\dfrac{2}{x+6}$

$-(x^4+6x^3)$

x^3+5x^2

$-(x^3+6x^2)$

$-x^2-8x$

$-(-x^2-6x)$

$-2x-14$

$-(-2x-12)$

-2

$$x^3+x^2-x-2-\frac{2}{x+6}$$

Divide using synthetic division.

5. $\dfrac{3x^3 - x^2 + x - 2}{x - 2}$

$$\begin{array}{c|cccc} 2 & 3 & -1 & 1 & -2 \\ & \downarrow & 6 & 10 & 22 \\ \hline & 3 & 5 & 11 & 20 \end{array}$$

$3x^2 + 5x + 11 + \dfrac{20}{x-2}$

6. $\dfrac{2x^3 - 4x^2 - 7x + 5}{x - 3}$

$$\begin{array}{c|cccc} 3 & 2 & -4 & -7 & 5 \\ & \downarrow & 6 & 6 & -3 \\ \hline & 2 & 2 & -1 & 2 \end{array}$$

$2x^2 + 2x - 1 + \dfrac{2}{x-3}$

7. $\dfrac{x^3 + 3x^2 - 2x - 6}{x + 3}$

$$\begin{array}{c|cccc} -3 & 1 & 3 & -2 & -6 \\ & \downarrow & -3 & 0 & 6 \\ \hline & 1 & 0 & -2 & 0 \end{array}$$

$x^2 - 2$

8. $\dfrac{3x^3 - 2x^2 + x + 4}{x + 1}$

$$\begin{array}{c|cccc} -1 & 3 & -2 & 1 & 4 \\ & \downarrow & -3 & 5 & -6 \\ \hline & 3 & -5 & 6 & -2 \end{array}$$

$3x^2 - 5x + 6 - \dfrac{2}{x+1}$

9. $\dfrac{t^4 + 5t^3 - 2t - 7}{t + 5}$

$$\begin{array}{c|ccccc} -5 & 1 & 5 & 0 & -2 & -7 \\ & \downarrow & -5 & 0 & 0 & 10 \\ \hline & 1 & 0 & 0 & -2 & 3 \end{array}$$

$t^3 - 2 + \dfrac{3}{t+5}$

10. $\dfrac{2u^4 - 5u^3 - 12u^2 + 2u - 8}{u - 4}$

$$\begin{array}{c|ccccc} 4 & 2 & -5 & -12 & 2 & -8 \\ & \downarrow & 8 & 12 & 0 & 8 \\ \hline & 2 & 3 & 0 & 2 & 0 \end{array}$$

$2u^3 + 3u^2 + 2$

11. $\dfrac{x^3 - 2x^2 + x - 1}{x - 2i}$

$$\begin{array}{c|cccc} 2i & 1 & -2 & 1 & -1 \\ & \downarrow & 2i & -4-4i & 8-6i \\ \hline & 1 & -2+2i & -3-4i & 7-6i \end{array}$$

$x^2 + (-2+2i)x - 3 - 4i + \dfrac{7-6i}{x-2i}$

12. $\dfrac{z^3 + 3z^2 - 2z + 3}{z - i}$

$$\begin{array}{c|cccc} i & 1 & 3 & -2 & 3 \\ & \downarrow & i & -1+3i & -3-3i \\ \hline & 1 & 3+i & -3+3i & -3i \end{array}$$

$z^2 + (3+i)z - 3 + 3i - \dfrac{3i}{z-i}$