

Name: KEY

**Section 3.3 – Division of Polynomials**

1. Use Long Division to divide the following, then factor the result

$6x^3 - 19x^2 + 11x + 6$  by the factor  $x - 2$

$$\begin{array}{r}
 6x^2 - 7x - 3 \\
 x - 2 \overline{) 6x^3 - 19x^2 + 11x + 6} \\
 \underline{- 6x^3 + 12x^2} \phantom{+ 11x + 6} \\
 -7x^2 + 11x \phantom{+ 6} \\
 \underline{- 7x^2 + 14x} \phantom{+ 6} \\
 -3x + 6 \\
 \underline{- 3x + 6} \\
 0
 \end{array}$$

$6x^3 - 19x^2 + 11x + 6 = (x - 2)(6x^2 - 7x - 3)$   
 $= (x - 2)(3x + 1)(2x - 3)$

2. When  $x^3 - x^2 + 5x + k$  is divided by  $x + 2$ , the remainder is 1. Find the value of  $k$ . (Use Long Division)

$$\begin{array}{r}
 x^2 - 3x + 11 \\
 x + 2 \overline{) x^3 - x^2 + 5x + k} \\
 \underline{- x^3 + 2x^2} \phantom{+ 5x + k} \\
 -3x^2 + 5x \phantom{+ k} \\
 \underline{- 3x^2 - 6x} \phantom{+ k} \\
 11x + k \\
 \underline{11x + 22} \\
 1
 \end{array}$$

← this needs to be 1

$k - 22 = 1$

$k = 23$

3. Use Synthetic division to divide the following.

$x^4 - 4x^3 - 15x^2 + 58x - 40$  by  $x - 5$

$$\begin{array}{r|rrrrr}
 5 & 1 & -4 & -15 & +58 & -40 \\
 & & 5 & 5 & -50 & 40 \\
 \hline
 & 1 & 1 & -10 & +8 & 0
 \end{array}$$

$x^4 - 4x^3 - 15x^2 + 58x - 40 = (x - 5)(x^3 + x^2 - 10x + 8)$

4. When  $x^3 + kx + 6$  is divided by  $x + 2$ , the remainder is 4. Find the value of  $k$ . (Use Synthetic Division)

$$\begin{array}{r|rrrr}
 -2 & 1 & 0 & +k & +6 \\
 & & -2 & 4 & -2k - 8 \\
 \hline
 & 1 & -2 & k + 4 & -2k - 2
 \end{array}$$

don't forget  $0x^2$

needs to be 4

$-2k - 2 = 4$

$-2k = 6$

$k = -3$