Name: _____ Date: _____

Learning Goal 3.2	Factoring, including the factor theorem and the remainder theorem.

Example Divide each of the following and provide a division statement. Identify any restrictions on the variable.

a. $x^3 - 4x^2 + 5x - 1$ by $x - 5$ (long division)

b. $x^3 - 4x^2 + 5x - 1$ by $x + 1$ (synthetic division)

The Remainder Theorem

Check:

Example Find the remainder of the quotient

$$\frac{x^4 - x^3 + 3x - 5}{x + 2}$$

a. using long division

b. using synthetic division

c. using the remainder theorem

Example When $x^3 + 3x^2 - kx + 10$ is divided by $x - 5$, the remainder is 15. Find the value of k.

Example When $P(x) = 3x^2mx^2 + nx - 7$ is divided by $x - 2$, the remainder is -3. When $P(x)$ is divided by $x + 1$, the remainder is -18. What are the values of m and n.

Exmaple $f(x) = x^4 + 3x^2 + 2$ has the same remainder as $g(x) = x^5 + mx^4 + x^3$ when divided by $x - 2$. Determine the value of m.