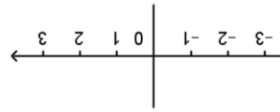
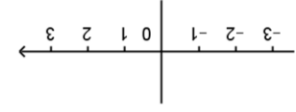


Factored form:



Sketch the graph:



Sketch the graph:

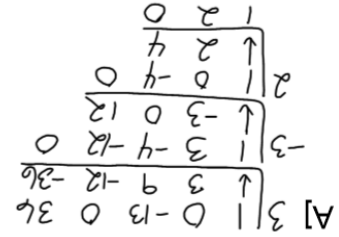
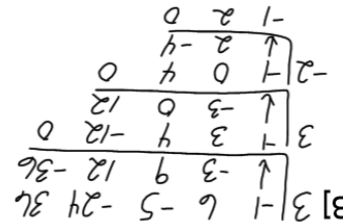
Factored form:

Standard form:

Factored form:

Standard form:

$f(x) = x^4 - 9x^3 + 23x^2 - 3x - 36$   
with factors  $(x+1)$  and  $(x-3)$  with multiplicity two

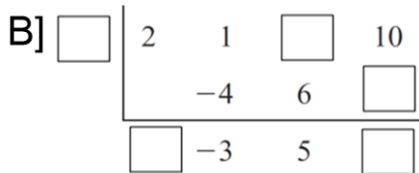
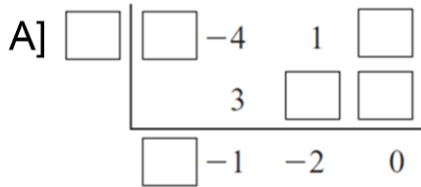


**Example 3** Factoring completely using synthetic division

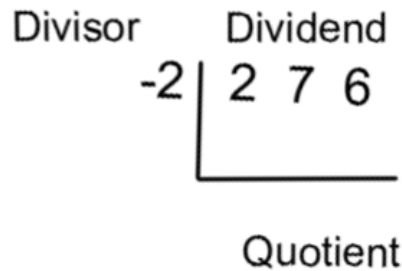
**Example 2** Analyzing synthetic division work to reconstruct a polynomial

**Example 4**

Complete the division problem



# Synthetic Division



**Example 1** How to decide if a binomial is a factor

**The Remainder Theorem:**

If  $f(x)$  is divided by  $(x-k)$ , then the remainder is  $f(k)$ .

**The Factor Theorem:**

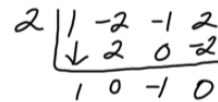
If a term divides evenly into a polynomial, then it is a factor.

A]  $(x^3 - 2x^2 - x + 2) \div (x - 2)$

Find the remainder

$f(2) = ( )^3 - 2( )^2 - ( ) + 2$

If the remainder is 0, do synth division



Rewrite as a product of two factors

B]  $(x^3 - x^2 - 16x - 20) \div (x + 5)$

C]  $(3x^3 + x^2 - 27x - 9) \div (x + 3)$