Theorem **Factor Theorem**

The expression $x - a$ is a linear factor of a polynomial if and only if the value a is a $\boxed{\text{zero}}$ of the related polynomial function.

Factor this quadratic $x^2 + 3x - 4 = (x + 4)(x - 1)$

Summary **Equivalent Statements about Polynomials**

① -4 is a $\boxed{\text{solution}}$ of $x^2 + 3x - 4 = 0$.

② -4 is an $\boxed{x\text{-intercept}}$ of the graph of $y = x^2 + 3x - 4$.

③ -4 is a $\boxed{\text{zero}}$ of $y = x^2 + 3x - 4$.

④ $x + 4$ is a $\boxed{\text{factor}}$ of $x^2 + 3x - 4$.

Find this quotient without a calculator.

1341 R5

18 ⟌ 24,143

18
61
54
74
72
23
18
5

How to deal with a remainder $\frac{24,143}{18} =$

1341 R5

18 ⟌ 24,143

18
61
54
74
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18
5

Ways to deal with a remainder

$$\frac{24,143}{18} = \begin{cases} 1341 \text{ R}5 \\ 1341\frac{5}{18} \\ 1341.2\overline{7} \end{cases}$$

Sec 6-3: Polynomial Division.

1. Find this quotient:

Polynomial Long Division

$(5x^3 + 13x^2 + 5x - 2) \div (x + 2) =$

$5x^2 + 3x - 1$

$x+2 \enclose{longdiv}{5x^3 + 13x^2 + 5x - 2}$

$-(5x^3 + 10x^2)$

$3x^2 + 5x$

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

$-x - 2$

$-(-x - 2)$

0

2. Find this quotient:

$(3x^3 - 8x^2 + 11x - 1) \div (x - 4) =$

$3x^2 + 4x + 27 \quad R\ 107$

$x-4 \enclose{longdiv}{3x^3 - 8x^2 + 11x - 1}$

$-(3x^3 - 12x^2)$

$4x^2 + 11x$

$-(4x^2 - 16x)$

$27x - 1$

$-(27x - 108)$

$+107$