

$$\begin{array}{r}
 x^3 + 2x \quad \overline{) \quad x^2 + x + 3} \\
 -x^3 + x^2 \\
 \hline
 x^2 + 2x \\
 -x^2 + x \\
 \hline
 3x \\
 -3x + 3 \\
 \hline
 3
 \end{array}$$

$$(x-1)(x^2+x+3)+3 = x^3+2x$$

$$q(x) \quad d(x) \quad + R = f(x)$$

(remainder)

$$\text{assume } d(x) = x - k$$

$$q(x)(x-k) + R = f(x)$$

$$f(k) = q(k)(k-k) + R$$

$$f(k) = R$$

$$\text{If } f(k) = R = 0$$

$$\text{then } q(x)(x-k) = f(x)$$

and $(x-k)$ is a factor of $f(x)$

Also, $x=k$ is a root of $f(x)$ because $f(k) = (k-k)(q(k)) = 0$
(makes the equation = 0)

Division algorithm

Remainder theorem

Factor theorem

Keep learning!

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