

	χ^3	$+0\chi^2$	$+6\chi$	$+3$
$\chi^3 - 2\chi + 2$	$\cancel{\chi^3}$	$+2\chi^2$	$\cancel{+6\chi}$	\downarrow
	0	$2\chi^2$	$+4\chi$	$+3$
	$\cancel{2\chi^2}$	$\cancel{+4\chi}$	$\cancel{+4}$	\downarrow
	0	8χ	-1	

ans.: $\chi + 2 \quad \frac{8\chi - 1}{\chi^2 - 2\chi + 2}$

$f(x) = (x+2) \cdot (x^2 - 2x + 2) + 8x - 1$

$= \chi^3 - 2\chi^2 + 2\chi + 2\chi^2 - 4\chi + 4 + 8\chi - 1$

$= \chi^3 - 2\chi + 4 + 8\chi - 1$

$= \chi^3 + 6\chi + 3 \checkmark$

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$\chi^4 - \chi^3 + \chi^2 - \chi + 2$ by $\chi - 2$

	χ^4	$- \chi^3$	$+ \chi^2$	$- \chi$	$+ 2$
2	χ^4	$- 2\chi^3$	$+ 2\chi^2$	$- 2\chi$	$+ 4$
	0	$+ \chi^3$	$- \chi^2$	$+ \chi$	$- 2$
	0	0	$+ 3\chi^2$	$- \chi$	$+ 4$
	0	0	0	$+ 2\chi$	$+ 2$
	0	0	0	0	0

$\chi^3 + \chi^2 + 3\chi + 5 \quad \frac{12}{\chi - 2}$

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$\frac{2\chi^3 - 7\chi^2 + 0\chi + 5}{\chi - 3}$

	2	-7	0	5
3	2	-6	-3	-9
	0	-1	-3	-4

$(\chi - 3) \cdot (2\chi^2 - \chi - 3) - 4$

$f(\frac{3}{1}) = 2(3)^3 - 7(3)^2 + 5$

$= 2(27) - 7(9) + 5$

$= 54 - 63 + 5$

$= -9 + 5$

$= -4$

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Factor Theorem

For $f(x)$, if $f(c) = 0$, then $\chi - c$ is a factor of $f(x)$

$f(x) = \chi^3 - 2\chi^2$

$= \chi^2(\chi - 2)$

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

$= 8 - 2(4)$

$= 8 - 8$

$= 0$

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$f(x) = \chi^3 - 3\chi + 2$

* Finding the Rational Zeros - of the form

$\frac{p}{q} = \frac{\text{factors of Constant term}}{\text{factors of the leading Coefficient term}}$

$\frac{p}{q} = \frac{2}{1} = \frac{\pm 1, \pm 2}{\pm 1}$

$= \frac{1}{1}, \frac{1}{-1}, \frac{-1}{1}, \frac{-1}{-1},$

$\frac{2}{1}, \frac{2}{-1}, \frac{-2}{1}, \frac{-2}{-1}$

$= 1, -1, 2, -2$

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