

October 16, 2017

ⓐ Long Division

$$\begin{array}{r} x^3 - 8x + 2 \leftarrow P(x) \\ \underline{x+3 \leftarrow D(x)} \\ x^3 + 0x^2 - 8x + 2 \\ \underline{-(x^2 + 3x)} \\ 0 + 3x^2 - 8x + 2 \\ \underline{-(3x^2 + 9x)} \\ 0 - 6x + 2 \\ \underline{-(6x + 18)} \\ 0 + 0 - 16 \end{array}$$

① $\frac{x^3}{x} = x^2$

② $\frac{-6x^2}{x} = -6x$

③ $\frac{-16}{x} = -\frac{16}{x}$

ans: $(x^2 - 6x - \frac{16}{x}) \cdot (x+3) - 16$

Check

$$\frac{(x+3)(x^2 - 6x + 1) - 1}{x+3}$$

$$\frac{x^3 - 3x^2 + 3x + 3 - 1}{x+3}$$

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

$$\frac{x^3 - 8x + 2}{x+3}$$

$x^3 - 8x + 2 = (x+3)(x^2 - 6x + 1) - 1$

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$$P(x) = \boxed{D(x)} \cdot \boxed{Q(x)} + \boxed{R(x)}$$

↓ Divisor
 ↓ Quotient
 ↓ Remainder

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

$D(x) = x + 1$

$Q(x) = ?$

$R(x) = ?$

$$\begin{array}{r} -x^3 - 6x + 2 \\ \underline{x+1} \\ -x^3 + 0x^2 - 6x + 2 \\ \underline{-(x^2 + x)} \\ 0 + x^2 - 7x + 2 \\ \underline{-(x^2 + x)} \\ 0 - 8x + 2 \\ \underline{-(8x + 8)} \\ 0 + 0 - 6 \end{array}$$

① $\frac{-x^3}{x} = -x^2$

② $\frac{x^2}{x} = x$

③ $\frac{-7x}{x} = -7$

④ $\frac{-6}{x} = -\frac{6}{x}$

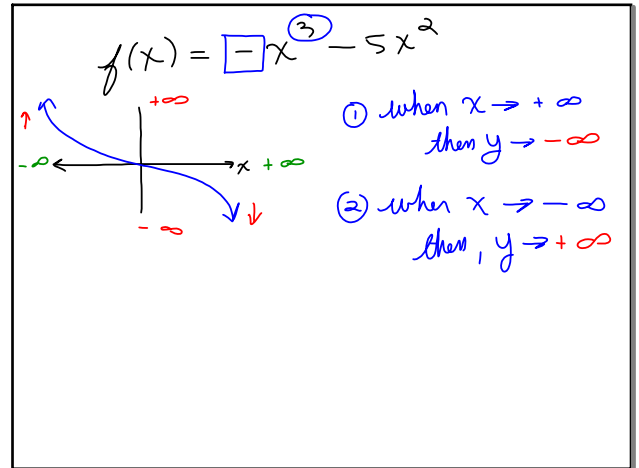
ans: $(-x^2 + x - 7) \cdot (x+1) - \frac{6}{x}$

$$-x^3 - 6x + 2 = \left[(x+1)(-x^2 + x - 7) \right] - \frac{6}{x}$$

$$= -x^3 + x^2 - 7x - 7 - \frac{6}{x}$$

$$= -x^3 - 6x + 2$$

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$P(x) = x^6 - 5x^4 + 2x^2 - 10$

$D(x) = x^2 - 5$

$$\begin{array}{r} x^6 + 0x^5 - 5x^4 + 0x^3 + 2x^2 + 0x^1 - 10 \\ \underline{x^2 - 5} \\ x^6 + 0x^5 - 5x^4 + 0x^3 + 2x^2 + 0x^1 - 10 \\ \underline{-(x^6 + 0x^5 - 5x^4 + 0x^3 - 5x^2 + 0x^1 - 5)} \\ 0 + 0 + 0 + 0 + 7x^2 + 0x^1 - 5 \end{array}$$

① $\frac{x^6}{x^2} = x^4$

② $\frac{0x^5}{x^2} = 0$

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