$$T(x)=\frac{(x^2+2x-2)^2+9(x^2+2x-2)+18}{x^4+x^3-8x-8}$$

Notăm: $x^2+2x-2=t$

$(x^2+2x-2)^2+9(x^2+2x-2)+18=t^2+9t+18=t^2+3t+6t+18=$

$=t(t+3)+6(t+3)=(t+3)(t+6)=$

$=(x^2+2x-2+3)\cdot(x^2+2x-2+6)=(x^2+2x-1)(x^2+2x+4)$

$x^2+2x-1=0$; $a=1$ $b=2$ $c=-1$ $\Rightarrow$ $\Delta=b^2-4ac=4-4\cdot1\cdot(-1)=8$; $\sqrt{\Delta}=2\sqrt{2}$

$$x_{1,2}=\frac{-b\pm\sqrt{\Delta}}{2a}=\frac{-2\pm2\sqrt{2}}{2}=\begin{cases}\frac{2\cdot(-1-\sqrt{2})}{2}=-1-\sqrt{2}\\ \frac{2\cdot(-1+\sqrt{2})}{2}=-1+\sqrt{2}\end{cases}$$

$x^2+2x-1=(x-(-1-\sqrt{2}))(x-(-1+\sqrt{2}))=(x+1+\sqrt{2})(x+1-\sqrt{2})$

$x^2+2x+4=0$; $a=1$ $b=2$ $c=4$ $\Rightarrow$ $\Delta=b^2-4ac=4-4\cdot1\cdot4=4-16=-12<0$

x^2+2x+4 = nu se descompune în $\mathbb{R}$

$Q(x)=$

$x^4+x^3-8x-8=x^3(x+1)-8(x+1)=(x+1)(x^3-8)$

V1

$a^3+b^3=(a+b)(a^2-ab+b^2)$

$a^3-b^3=(a-b)(a^2+ab+b^2)$ $\Rightarrow$ $x^3-2^3=(x-2)(x^2+2x+4)$

V2

$P(x)=x^3-8=1\cdot x^3+0\cdot x^2+0\cdot x-8$

$D_8=\{\pm1,\pm2,\pm4,\pm8\}$

$P(1)=1^3-8=1-8\neq0$

$P(-1)=(-1)^3-8=-1-8\neq0$

$P(2)=2^3-8=8-8=0$

	1	0	0	-8
2	1	2	4	0

$\Rightarrow$

$$P(x) = (x-2)\cdot(x^2+2x+4)$$

$$Q(x) = (x+1)(x-2)(x^2+2x+4)$$

$$\text{P.c. } Q(x) \neq 0 \iff x+1 \neq 0 \text{ și } x-2 \neq 0 \text{ și } \underbrace{x^2+2x+4 \neq 0}_{\text{am dem. } (\forall)\, x \in \mathbb{R}}$$

$$x \neq -1 \qquad x \neq 2$$

$$x \in \mathbb{R} \setminus \{-1; 2\}$$

$$T(x) = \frac{(x+1+\sqrt{2})(x+1-\sqrt{2})\cancelto{1}{(x^2+2x+4)}}{(x+1)(x-2)\cancelto{1}{(x^2+2x+4)}}$$

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