

5.1 - Forme canonique

Déterminer la forme canonique des expressions suivantes :

$$A_1(x) = x^2 + 8x - 13$$

$$A_2(x) = x^2 - 5x - 11$$

$$A_3(x) = x^2 - 7x + 9$$

$$A_4(x) = x^2 + 11x + 7$$

$$A_5(x) = 2x^2 + 8x - 9$$

$$A_6(x) = 3x^2 - 12x + 5$$

$$A_7(x) = -2x^2 + 6x + 13$$

$$A_8(x) = 3x^2 - 5x + 12$$

$$A_9(x) = 5x^2 - 7x + 11$$

$$A_{10}(x) = -3x^2 + 15x - 7$$

$$A_{11}(x) = x^2 + 10x - 12$$

$$A_{12}(x) = x^2 - 7x + 7$$

$$A_{13}(x) = x^2 + 3x + 10$$

$$A_{14}(x) = x^2 + 9x - 5$$

$$A_{15}(x) = 2x^2 + 12x - 9$$

$$A_{16}(x) = 5x^2 - 15x + 7$$

$$A_{17}(x) = -3x^2 + 6x + 8$$

$$A_{18}(x) = 4x^2 - 5x + 13$$

$$A_{19}(x) = 7x^2 - 5x - 8$$

$$A_{20}(x) = -5x^2 + 15x + 8$$

$$A_{21}(x) = x^2 + 4x - 12$$

$$A_{22}(x) = x^2 + 5x + 9$$

$$A_{23}(x) = x^2 - 9x - 3$$

$$A_{24}(x) = x^2 + 13x - 5$$

$$A_{25}(x) = 2x^2 - 6x - 3$$

$$A_{26}(x) = 7x^2 - 21x + 3$$

$$A_{27}(x) = -4x^2 + 12x + 5$$

$$A_{28}(x) = 3x^2 - 5x + 11$$

$$A_{29}(x) = 3x^2 - 8x - 5$$

$$A_{30}(x) = -3x^2 + 13x + 7$$

$$A_{31}(x) = x^2 - 4x + 5$$

$$A_{32}(x) = x^2 + 3x + 9$$

$$A_{33}(x) = x^2 - 7x - 10$$

$$A_{34}(x) = x^2 + 9x - 7$$

$$A_{35}(x) = 2x^2 - 8x + 12$$

$$A_{36}(x) = 5x^2 - 10x + 7$$

$$A_{37}(x) = -3x^2 + 12x + 8$$

$$A_{38}(x) = 7x^2 - 5x - 6$$

$$A_{39}(x) = 5x^2 - 8x + 7$$

$$A_{40}(x) = -7x^2 + 12x - 3$$

$$A_{41}(x) = x^2 - 6x + 1$$

$$A_{42}(x) = x^2 + 9x + 4$$

$$A_{43}(x) = x^2 - 3x - 5$$

$$A_{44}(x) = x^2 + 7x - 10$$

$$A_{45}(x) = 3x^2 - 9x + 12$$

$$A_{46}(x) = 4x^2 - 11x + 5$$

$$A_{47}(x) = -5x^2 + 9x - 3$$

$$A_{48}(x) = 3x^2 - 5x + 13$$

$$A_{49}(x) = 7x^2 - 10x + 1$$

$$A_{50}(x) = -9x^2 + 11x + 2$$

$$A_{51}(x) = x^2 - 8x + 5$$

$$A_{52}(x) = x^2 + 3x - 5$$

$$A_{53}(x) = x^2 - 5x + 7$$

$$A_{54}(x) = x^2 + 3x - 13$$

$$A_{55}(x) = 4x^2 - 12x + 8$$

$$A_{56}(x) = 6x^2 - 11x + 7$$

$$A_{57}(x) = -3x^2 + 8x + 5$$

$$A_{58}(x) = 5x^2 - 3x - 7$$

$$A_{59}(x) = 3x^2 - 13x + 5$$

$$A_{60}(x) = -7x^2 + 6x + 1$$

$$A_{61}(x) = x^2 + 6x - 4$$

$$A_{62}(x) = x^2 + 5x - 9$$

$$A_{63}(x) = x^2 + 7x + 7$$

$$A_{64}(x) = x^2 + 9x - 14$$

$$A_{65}(x) = 5x^2 - 15x + 25$$

$$A_{66}(x) = 4x^2 - 13x + 8$$

$$A_{67}(x) = -5x^2 + 8x - 6$$

$$A_{68}(x) = 3x^2 - 5x + 8$$

$$A_{69}(x) = 5x^2 - 11x + 9$$

$$A_{70}(x) = -3x^2 + 5x - 4$$

$$A_{71}(x) = x^2 - 2x - 3$$

$$A_{72}(x) = x^2 + 3x - 7$$

$$A_{73}(x) = x^2 - 5x + 9$$

$$A_{74}(x) = x^2 + 9x + 1$$

$$A_{75}(x) = 6x^2 - 30x + 12$$

$$A_{76}(x) = 5x^2 - 11x + 9$$

$$A_{77}(x) = -3x^2 + 9x + 7$$

$$A_{78}(x) = 4x^2 - 7x + 5$$

$$A_{79}(x) = 2x^2 - 19x + 3$$

$$A_{80}(x) = -5x^2 + 7x - 8$$

$$A_{81}(x) = x^2 - 6x + 4$$

$$A_{82}(x) = x^2 + 7x - 1$$

$$A_{83}(x) = x^2 - 3x + 8$$

$$A_{84}(x) = x^2 + 3x + 4$$

$$A_{85}(x) = 4x^2 - 28x + 12$$

$$A_{86}(x) = 3x^2 - 7x + 10$$

$$A_{87}(x) = -5x^2 + 7x - 3$$

$$A_{88}(x) = 6x^2 - 5x + 12$$

$$A_{89}(x) = 3x^2 - 17x + 4$$

$$A_{90}(x) = -7x^2 + 5x - 5$$

$$A_{91}(x) = x^2 - 10x + 3$$

$$A_{92}(x) = x^2 + 5x - 3$$

$$A_{93}(x) = x^2 + 7x + 8$$

$$A_{94}(x) = x^2 - 9x + 1$$

$$A_{95}(x) = 3x^2 - 18x + 9$$

$$A_{96}(x) = 4x^2 - 7x + 12$$

$$A_{97}(x) = -7x^2 + 5x - 8$$

$$A_{98}(x) = 4x^2 - 7x + 16$$

$$A_{99}(x) = 5x^2 - 13x + 2$$

$$A_{100}(x) = -9x^2 + 4x - 7$$

5.2 - Équations du second degré - niveau 1

Résoudre les équations suivantes :

$$(E_1) : x^2 + 6x - 7 = 0$$

$$(E_2) : 6x^2 + 7x - 3 = 0$$

$$(E_3) : 2x^2 + x + 1 = 0$$

$$(E_4) : 49x^2 - 42x + 9 = 0$$

$$(E_5) : -12x^2 + 11x - 2 = 0$$

$$(E_6) : 25x^2 - 30x - 4 = 0$$

$$(E_7) : 49x^2 - 14x + \frac{7}{4} = 0$$

$$(E_8) : 3x^2 - 8x + 7 = 2x^2 - x + 3$$

$$(E_9) : -4x^2 + 20x - 5 = 5x^2 - 10x + 20$$

$$(E_{10}) : (2x + 1)(x - 3) = -2x^2 - 10x - 12$$

$$(E_{11}) : x^2 + 3x - 10 = 0$$

$$(E_{12}) : 9x^2 - 12x + 4 = 0$$

$$(E_{13}) : 2x^2 + 3x + 9 = 0$$

$$(E_{14}) : -3x^2 + 2x - 5 = 0$$

$$(E_{15}) : 24x^2 + 34x - 10 = 0$$

$$(E_{16}) : x^2 - 5x + 2 = 0$$

$$(E_{17}) : 5x^2 - \frac{2}{3}x + \frac{1}{4} = 0$$

$$(E_{18}) : 10x^2 + 20x + 5 = 35x^2 - 10x + 2$$

$$(E_{19}) : 47x^2 - 53x - 1 = -2x^2 + 3x - 17$$

$$(E_{20}) : (4x - 1)(x - 5) = -4x^2 - 44x - 40$$

$$(E_{21}) : x^2 - 3x - 4 = 0$$

$$(E_{22}) : 5x^2 + 4x + 2 = 0$$

$$(E_{23}) : 4x^2 - 6x + 3 = 0$$

$$(E_{24}) : 9x^2 - 30x + 25 = 0$$

$$(E_{25}) : -15x^2 - 2x + 1 = 0$$

$$(E_{26}) : 4x^2 - 5x - 6 = 0$$

$$(E_{27}) : 3x^2 + 4x + \frac{10}{3} = 0$$

$$(E_{28}) : 5x^2 - 3x + 2 = 2x^2 - 7x + 3$$

$$(E_{29}) : -3x^2 + 7x + 1 = 2x^2 + x - 5$$

$$(E_{30}) : (2x - 3)(x + 2) = 4x^2 + 6x + 3$$

$$(E_{31}) : x^2 + 3x - 10 = 0$$

$$(E_{32}) : 5x^2 - 4x + 3 = 0$$

$$(E_{33}) : 5x^2 - 8x + 4 = 0$$

$$(E_{34}) : 4x^2 - 28x + 49 = 0$$

$$(E_{35}) : 12x^2 + 17x - 7 = 0$$

$$(E_{36}) : 4x^2 - 5x - 4 = 0$$

$$(E_{37}) : 5x^2 + 6x + \frac{24}{5} = 0$$

$$(E_{38}) : 3x^2 - 8x - 4 = x^2 - 2x + 5$$

$$(E_{39}) : -5x^2 + 2x - 3 = 2x^2 - 4x - 5$$

$$(E_{40}) : (4x + 3)(2x - 1) = -6x^2 - x + 4$$

$$(E_{41}) : x^2 + x - 30 = 0$$

$$(E_{42}) : 7x^2 + 2x + 3 = 0$$

$$(E_{43}) : 6x^2 - 10x + 7 = 0$$

$$(E_{44}) : 9x^2 + 30x + 25 = 0$$

$$(E_{45}) : 6x^2 + 7x - 2 = 0$$

$$(E_{46}) : 5x^2 + 3x - 3 = 0$$

$$(E_{47}) : 7x^2 + 4x + \frac{39}{7} = 0$$

$$(E_{48}) : 7x^2 - 2x + 5 = 4x^2 + x + 10$$

$$(E_{49}) : -8x^2 + 7x + 3 = -3x^2 - x - 1$$

$$(E_{50}) : (3x + 2)(x - 5) = -2x^2 + 18x - 2$$

$$(E_{51}) : x^2 - 6x - 16 = 0$$

$$(E_{52}) : 3x^2 - 10x + 9 = 0$$

$$(E_{53}) : 3x^2 - 14x + 21 = 0$$

$$(E_{54}) : 25x^2 - 60x + 36 = 0$$

$$(E_{55}) : 12x^2 + 4x - 1 = 0$$

$$(E_{56}) : 2x^2 - 7x - 3 = 0$$

$$(E_{57}) : 4x^2 - 6x + \frac{13}{4} = 0$$

$$(E_{58}) : 2x^2 - 7x + 3 = x^2 - 4x + 5$$

$$(E_{59}) : -2x^2 + 5x + 1 = 3x^2 + 7x - 2$$

$$(E_{60}) : (5x - 2)(3x + 1) = -7x^2 - 8x + 5$$

$$(E_{61}) : x^2 + 7x + 10 = 0$$

$$(E_{62}) : 6x^2 - 17x - 5 = 0$$

$$(E_{63}) : 9x^2 - 6x + 2 = 0$$

$$(E_{64}) : 25x^2 - 30x + 9 = 0$$

$$(E_{65}) : 15x^2 + 2x - 1 = 0$$

$$(E_{66}) : 4x^2 + 20x + 18 = 0$$

$$(E_{67}) : 16x^2 - 8x + \frac{7}{4} = 0$$

$$(E_{68}) : 6x^2 - 7x - 2 = -3x^2 + 5x + 5$$

$$(E_{69}) : 10x^2 - 50x + 18 = -6x^2 - 106x - 31$$

$$(E_{70}) : (15x - 1)(2x + 1) = 5x^2 + 33x - 5$$

$$(E_{71}) : x^2 + x - 12 = 0$$

$$(E_{72}) : 12x^2 + 5x - 2 = 0$$

$$(E_{73}) : 16x^2 - 24x + 11 = 0$$

$$(E_{74}) : 9x^2 + 42x + 49 = 0$$

$$(E_{75}) : 14x^2 + 19x - 3 = 0$$

$$(E_{76}) : 4x^2 + 20x + 20 = 0$$

$$(E_{77}) : 4x^2 + 28x + \frac{249}{5} = 0$$

$$(E_{78}) : 5x^2 + 2x - 8 = 21x^2 + 18x - 11$$

$$(E_{79}) : 5x^2 - 7x + 4 = x^2 + 5x - 5$$

$$(E_{80}) : (3x - 4)(2x + 5) = -3x^2 - 41x - 88$$

$$(E_{81}) : x^2 - 5x - 14 = 0$$

$$(E_{82}) : 10x^2 + 13x - 3 = 0$$

$$(E_{83}) : 16x^2 - 16x + 7 = 0$$

$$(E_{84}) : 9x^2 - 30x + 25 = 0$$

$$(E_{85}) : 8x^2 + 26x - 7 = 0$$

$$(E_{86}) : 9x^2 + 30x + 19 = 0$$

$$(E_{87}) : 4x^2 + 12x + \frac{29}{3} = 0$$

$$(E_{88}) : 17x^2 - 8x + 9 = -8x^2 + 12x + 18$$

$$(E_{89}) : 7x^2 + 40x + 100 = 3x^2 + 4x + 19$$

$$(E_{90}) : (3x + 7)(4x - 2) = -4x^2 - 2x - 28$$

$$(E_{91}) : x^2 - 7x - 18 = 0$$

$$(E_{92}) : 15x^2 - x - 6 = 0$$

$$(E_{93}) : 49x^2 + 42x + 10 = 0$$

$$(E_{94}) : 25x^2 - 40x + 16 = 0$$

$$(E_{95}) : 16x^2 + 2x - 3 = 0$$

$$(E_{96}) : 16x^2 + 40x + 17 = 0$$

$$(E_{97}) : 9x^2 + 6x + \frac{8}{7} = 0$$

$$(E_{98}) : 50x^2 + 80x + 1 = x^2 + 38x - 3$$

$$(E_{99}) : 30x^2 + 21x + 8 = 5x^2 - 9x - 1$$

$$(E_{100}) : (2x + 5)(3x - 1) = 2x^2 - 15x - 63$$

5.3 - Factorisation

Factoriser si possible au maximum les expressions suivantes :

$$A_1(x) = x^2 + x - 6$$

$$A_2(x) = 2x^2 - 7x - 4$$

$$A_3(x) = -3x^2 - 3x + 6$$

$$A_4(x) = 2x^2 + 5x + 17$$

$$A_5(x) = -3x^2 + 2x - 9$$

$$A_6(x) = -10x^2 + 10x + 120$$

$$A_7(x) = -7x^2 - \frac{7}{2}x + 21$$

$$A_8(x) = 8x^2 - 24x - 8$$

$$A_9(x) = x^3 + x - 2$$

$$A_{10}(x) = -4x^3 - 10x^2 + 44x - 30$$

$$A_{11}(x) = x^2 + 9x + 18$$

$$A_{12}(x) = -20x^2 + 44x + 48$$

$$A_{13}(x) = -3x^2 + 33x - 90$$

$$A_{14}(x) = 4x^2 - 9x + 12$$

$$A_{15}(x) = -7x^2 - 7x - 6$$

$$A_{16}(x) = -10x^2 + 10x + 60$$

$$A_{17}(x) = -5x^2 + \frac{55}{4}x - 35$$

$$A_{18}(x) = 9x^2 + 81x + 153$$

$$A_{19}(x) = x^3 + 5x^2 + 8x - 14$$

$$A_{20}(x) = x^3 + 11x^2 + 38x + 40$$

$$A_{21}(x) = x^2 - 7x + 10$$

$$A_{22}(x) = 20x^2 - 104x - 96$$

$$A_{23}(x) = -3x^2 + 30x - 63$$

$$A_{24}(x) = 9x^2 - 6x + 5$$

$$A_{25}(x) = -9x^2 + 6x - 4$$

$$A_{26}(x) = -10x^2 + 10x + 120$$

$$A_{27}(x) = -7x^2 - \frac{154}{9}x + 105$$

$$A_{28}(x) = 8x^2 + 64x + 72$$

$$A_{29}(x) = x^3 - 11x^2 + 47x - 58$$

$$A_{30}(x) = -2x^3 - 6x^2 + 26x + 30$$

$$A_{31}(x) = x^2 + 3x + 2$$

$$A_{32}(x) = 20x^2 + 24x - 32$$

$$A_{33}(x) = -2x^2 - 24x - 54$$

$$A_{34}(x) = 2x^2 - 9x + 15$$

$$A_{35}(x) = -2x^2 + 7x + 2$$

$$A_{36}(x) = -10x^2 - 20x + 80$$

$$A_{37}(x) = -7x^2 - \frac{203}{8}x - 105$$

$$A_{38}(x) = 9x^2 + 63x + 63$$

$$A_{39}(x) = x^3 - 5x^2 + 5x + 11$$

$$A_{40}(x) = -x^3 - 5x^2 - 2x + 8$$

$$A_{41}(x) = x^2 - 10x + 16$$

$$A_{42}(x) = 2x^2 - x - 3$$

$$A_{43}(x) = -4x^2 + 36x - 80$$

$$A_{44}(x) = 6x^2 - 5x + 10$$

$$A_{45}(x) = -5x^2 - 9x - 2$$

$$A_{46}(x) = -10x^2 + 70x - 100$$

$$A_{47}(x) = -8x^2 - 12x - 24$$

$$A_{48}(x) = 6x^2 - 36x + 12$$

$$A_{49}(x) = x^3 + 7x^2 + 17x - 25$$

$$A_{50}(x) = -3x^3 + 3x^2 + 111x + 105$$

$$A_{51}(x) = x^2 + 3x - 40$$

$$A_{52}(x) = -15x^2 + 27x + 54$$

$$A_{53}(x) = -4x^2 + 48x - 128$$

$$A_{54}(x) = 2x^2 + 8x + 13$$

$$A_{55}(x) = -3x^2 + 9x - 3$$

$$A_{56}(x) = -10x^2 + 110x - 180$$

$$A_{57}(x) = -7x^2 + \frac{49}{4}x + 105$$

$$A_{58}(x) = 7x^2 + 63x + 28$$

$$A_{59}(x) = x^3 - 7x^2 + 19x - 13$$

$$A_{60}(x) = 3x^3 - 6x^2 - 33x + 36$$

$$A_{61}(x) = x^2 + 3x + 2$$

$$A_{62}(x) = 10x^2 - 22x - 24$$

$$A_{63}(x) = -2x^2 - 8x + 42$$

$$A_{64}(x) = 7x^2 - 4x + 6$$

$$A_{65}(x) = -9x^2 - 7x - 9$$

$$A_{66}(x) = -10x^2 - 30x + 100$$

$$A_{67}(x) = -7x^2 - \frac{56}{6}x + 56$$

$$A_{68}(x) = 7x^2 + 35x + 35$$

$$A_{69}(x) = x^3 + 3x^2 + 12x + 10$$

$$A_{70}(x) = x^3 + 2x^2 - 13x + 10$$

$$A_{71}(x) = x^2 - 14x + 45$$

$$A_{72}(x) = 25x^2 - 120x - 180$$

$$A_{73}(x) = -4x^2 - 12x + 72$$

$$A_{74}(x) = 3x^2 - 4x + 7$$

$$A_{75}(x) = -9x^2 + 4x - 5$$

$$A_{76}(x) = -10x^2 + 150x - 540$$

$$A_{77}(x) = -8x^2 - \frac{208}{7}x - 120$$

$$A_{78}(x) = 6x^2 + 36x + 6$$

$$A_{79}(x) = x^3 + 6x^2 + 14x + 12$$

$$A_{80}(x) = x^3 - 3x^2 - 10x + 24$$

$$A_{81}(x) = x^2 - 8x + 15$$

$$A_{82}(x) = 15x^2 - 9x - 6$$

$$A_{83}(x) = -2x^2 + 26x - 72$$

$$A_{84}(x) = 8x^2 + 3x + 7$$

$$A_{85}(x) = -6x^2 + 4x - 3$$

$$A_{86}(x) = -10x^2 - 10x + 200$$

$$A_{87}(x) = -5x^2 - \frac{175}{8}x - 60$$

$$A_{88}(x) = 5x^2 - 35x + 15$$

$$A_{89}(x) = x^3 + 7x - 8$$

$$A_{90}(x) = -2x^3 + 14x + 12$$

$$A_{91}(x) = x^2 + 6x + 5$$

$$A_{92}(x) = 4x^2 + 22x + 30$$

$$A_{93}(x) = -2x^2 - 6x + 36$$

$$A_{94}(x) = 9x^2 + 3x + 3$$

$$A_{95}(x) = -5x^2 - 6x - 1$$

$$A_{96}(x) = -10x^2 + 30x + 540$$

$$A_{97}(x) = -9x^2 - \frac{117}{2}x - 180$$

$$A_{98}(x) = 5x^2 + 30x + 30$$

$$A_{99}(x) = x^3 - 4x^2 + 8x - 5$$

$$A_{100}(x) = x^3 - 7x^2 + 2x + 40$$

5.4 - Équations du second degré - niveau 2

Résoudre les équations suivantes :

$(E_1) : x^4 - 9x^2 + 20 = 0$	$(E_{22}) : x^4 - x^2 - 12 = 0$	$(E_{43}) : x^3 - 6x^2 + 16x - 21 = 0$
$(E_2) : x^4 + 2x^2 - 15 = 0$	$(E_{23}) : 3x^3 + 2x^2 + 1 = 0$	$(E_{44}) : 4x^3 - 21x^2 - 51x + 14 = 0$
$(E_3) : 2x^3 - x^2 - 1 = 0$	$(E_{24}) : 4x^3 - x^2 - 27x - 18 = 0$	$(E_{45}) : \frac{3x^2 - 8x + 2}{4x^2 + 2x - 54} = 1$
$(E_4) : 2x^3 - x^2 - 12x - 9 = 0$	$(E_{25}) : \frac{5x^2 + 2x - 3}{2x^2 - 4x - 12} = 2$	$(E_{46}) : \frac{-4x^2 + 7x + 5}{2x^2 - 3x + 1} = -4$
$(E_5) : \frac{2x^2 + 7x - 3}{5x^2 - 3x + 5} = 1$	$(E_{26}) : \frac{9x^2 - 10x + 9}{2x^2 - 4x + 3} = 2$	$(E_{47}) : \frac{4}{x+2} - \frac{3}{2x+1} = 7$
$(E_6) : \frac{38 - 11x^2}{7x^2 - 4x - 44} = -1$	$(E_{27}) : \frac{2}{x+1} - \frac{3}{2x+1} = -1$	$(E_{48}) : \frac{1}{x-1} - \frac{3}{4x-1} = \frac{5}{22}$
$(E_7) : \frac{1}{3x-2} + \frac{1}{4x-3} = 2$	$(E_{28}) : \frac{4}{2x-3} + \frac{2}{3x-1} = -\frac{13}{10}$	$(E_{49}) : x - 17\sqrt{x} + 16 = 0$
$(E_8) : \frac{3}{x+4} - \frac{5}{3x+1} = \frac{5}{2}$	$(E_{29}) : x - 29\sqrt{x} + 100 = 0$	$(E_{50}) : \frac{2}{x-2} - \frac{8}{x-3} = 2 - \frac{8}{(x-3)(x-2)}$
$(E_9) : x - 5\sqrt{x} + 6 = 0$	$(E_{30}) : \frac{3}{x-2} - \frac{3}{(x-1)(x-2)} = 2 - \frac{2}{x-1}$	$(E_{51}) : x^4 + 3x^2 - 10 = 0$
$(E_{10}) : \frac{4}{x} + \frac{2}{x(x-1)} = 5 + \frac{2}{(x-1)}$	$(E_{31}) : x^4 - 4x^2 - 5 = 0$	$(E_{52}) : x^4 - 21x^2 + 80 = 0$
$(E_{11}) : x^4 + x^2 - 12 = 0$	$(E_{32}) : x^4 - 17x^2 + 72 = 0$	$(E_{53}) : x^3 - x^2 - 3x + 6 = 0$
$(E_{12}) : x^4 - 10x^2 + 9 = 0$	$(E_{33}) : 2x^3 + 2x^2 - x + 6 = 0$	$(E_{54}) : 2x^3 - 9x^2 + 4x + 15 = 0$
$(E_{13}) : x^3 - x^2 - x - 2 = 0$	$(E_{34}) : 6x^3 - 19x^2 + 16x - 4 = 0$	$(E_{55}) : \frac{5x^2 - 8x - 7}{2x^2 + 5x + 3} = 1$
$(E_{14}) : 3x^3 - 14x^2 + 7x + 4 = 0$	$(E_{35}) : \frac{2x^2 - 5x + 9}{x^2 - 2x + 1} = 3$	$(E_{56}) : \frac{x^2 - 3x - 4}{2x^2 + x + 5} = -1$
$(E_{15}) : \frac{4x^2 - 3x + 7}{2x^2 + 3x + 27} = 1$	$(E_{36}) : \frac{-3x^2 + x + 16}{2x^2 - x - 3} = -3$	$(E_{57}) : \frac{5}{x+3} - \frac{2}{2x-5} = 3$
$(E_{16}) : \frac{4x^2 - 5x + 7}{-2x^2 + 6x + 3} = -1$	$(E_{37}) : \frac{21}{x+4} - \frac{14}{x-2} = -11$	$(E_{58}) : \frac{1}{2x-5} - \frac{3}{x+2} = -\frac{7}{4}$
$(E_{17}) : \frac{9}{x-3} - \frac{9}{2x+1} = 8$	$(E_{38}) : \frac{3}{2x-3} - \frac{2}{x-4} = -\frac{11}{7}$	$(E_{59}) : x - 3\sqrt{x} - 10 = 0$
$(E_{18}) : \frac{3}{x-2} - \frac{2}{2x+3} = \frac{25}{9}$	$(E_{39}) : x - 5\sqrt{x} - 36 = 0$	$(E_{60}) : \frac{2}{x+3} + \frac{1}{x-4} = 4 + \frac{7}{(x+3)(x-4)}$
$(E_{19}) : x + 3\sqrt{x} - 4 = 0$	$(E_{40}) : \frac{8}{x+1} - \frac{8}{(x+1)(x+2)} = 3 - \frac{5}{x+2}$	$(E_{61}) : x^4 - 4x^2 - 12 = 0$
$(E_{20}) : \frac{4}{x-1} - \frac{8}{x^2-1} = 3 + \frac{2}{x+1}$	$(E_{41}) : x^4 - 6x^2 + 8 = 0$	$(E_{62}) : x^4 - 17x^2 + 16 = 0$
$(E_{21}) : x^4 - 12x^2 + 27 = 0$	$(E_{42}) : x^4 - 8x^2 - 9 = 0$	$(E_{63}) : x^3 - 5x + 12 = 0$
		$(E_{64}) : 3x^3 + 16x^2 - 60x + 32 = 0$

$$(E_{65}) : \frac{7x^2 - 8x - 25}{5x^2 + 3x + 15} = 1$$

$$(E_{66}) : \frac{x^2 - 6x + 5}{x^2 - 4x + 4} = 2$$

$$(E_{67}) : \frac{4}{-3x + 4} + \frac{6}{x + 5} = 5$$

$$(E_{68}) : \frac{6}{2x - 1} + \frac{5}{3x + 2} = -\frac{11}{7}$$

$$(E_{69}) : x - 9\sqrt{x} + 8 = 0$$

$$(E_{70}) : \frac{3}{x + 2} + \frac{6}{x(x + 2)} = 5 + \frac{4}{x}$$

$$(E_{71}) : x^4 + 4x^2 - 5 = 0$$

$$(E_{72}) : x^4 - 16x^2 + 63 = 0$$

$$(E_{73}) : 3x^3 - 4x^2 + 2x - 1 = 0$$

$$(E_{74}) : 2x^3 + 7x^2 - 9 = 0$$

$$(E_{75}) : \frac{-4x^2 - 15x + 9}{x^2 + 2x + 1} = 2$$

$$(E_{76}) : \frac{2x^2 - 5x + 3}{x^2 + x + 1} = -2$$

$$(E_{77}) : \frac{4}{2x + 3} + \frac{7}{3x - 1} = -5$$

$$(E_{78}) : \frac{2}{4x + 3} + \frac{4}{x - 5} = -\frac{5}{7}$$

$$(E_{79}) : x - 4\sqrt{x} - 21 = 0$$

$$(E_{80}) : \frac{5}{x + 3} - \frac{2}{x - 3} = 3 - \frac{12}{x^2 - 9}$$

$$(E_{81}) : x^4 - 3x^2 - 28 = 0$$

$$(E_{82}) : x^4 - 13x^2 + 36 = 0$$

$$(E_{83}) : 2x^3 - x^2 - 12 = 0$$

$$(E_{84}) : 4x^3 - 9x^2 - 19x + 30 = 0$$

$$(E_{85}) : \frac{-x^2 + 6x + 16}{x^2 + x + 2} = 3$$

$$(E_{86}) : \frac{x^2 + 7x - 9}{x^2 + 2x - 3} = 2$$

$$(E_{87}) : \frac{1}{5 - x} - \frac{5}{x + 3} = -1$$

$$(E_{88}) : \frac{3}{2x - 3} - \frac{1}{2x + 7} = \frac{8}{15}$$

$$(E_{89}) : x - 14\sqrt{x} + 40 = 0$$

$$(E_{90}) : \frac{3}{x + 1} + \frac{4}{2x - 1} = 1 + \frac{6}{(x + 1)(2x - 1)}$$

$$(E_{91}) : x^4 + 5x^2 - 36 = 0$$

$$(E_{92}) : x^4 - 8x^2 + 15 = 0$$

$$(E_{93}) : -x^3 + 6x^2 - 10x + 8 = 0$$

$$(E_{94}) : 4x^3 - 4x^2 - 29x - 21 = 0$$

$$(E_{95}) : \frac{3x^2 + 34x - 16}{x^2 - 3x + 2} = -2$$

$$(E_{96}) : \frac{4x^2 - 19x + 23}{x^2 - 5x + 6} = 3$$

$$(E_{97}) : \frac{3}{4x + 1} + \frac{5}{x + 2} = 4$$

$$(E_{98}) : \frac{4}{3x + 2} + \frac{3}{x - 6} = -\frac{11}{8}$$

$$(E_{99}) : x - 6\sqrt{x} - 27 = 0$$

$$(E_{100}) : \frac{2}{3x - 2} + \frac{7}{x - 1} = 4 + \frac{7}{(3x - 2)(x - 1)}$$

5.5 - Étude de signes

Déterminer le signe des expressions suivantes :

$$A_1(x) = 2x^2 - 2x - 24$$

$$A_2(x) = -8x^2 + 22x - 15$$

$$A_3(x) = 2x^2 + x + 1$$

$$A_4(x) = -4x^2 - 4x - 5$$

$$A_5(x) = 3x^2 + 4x - 2$$

$$A_6(x) = -7x^2 + 3x - 5$$

$$A_7(x) = 5x^2 + 4x + \frac{4}{5}$$

$$A_8(x) = x^3 + x - 2$$

$$A_9(x) = 2x^3 + 7x^2 - 17x - 10$$

$$A_{10}(x) = -4x^3 + 7x^2 + 12x + 9$$

$$A_{11}(x) = 2x^2 - 4x - 16$$

$$A_{12}(x) = -6x^2 + 5x + 4$$

$$A_{13}(x) = 3x^2 - x + 2$$

$$A_{14}(x) = -2x^2 + x - 5$$

$$A_{15}(x) = 3x^2 - 5x + 1$$

$$A_{16}(x) = -9x^2 + 6x - 1$$

$$A_{17}(x) = 3x^2 - 4x + \frac{4}{3}$$

$$A_{18}(x) = x^3 - x^2 - 4$$

$$A_{19}(x) = 4x^3 - 18x^2 + 6x + 8$$

$$A_{20}(x) = -2x^3 + 9x^2 - 14x + 15$$

$$A_{21}(x) = 3x^2 - 6x - 9$$

$$A_{22}(x) = -12x^2 - 5x + 2$$

$$A_{23}(x) = 4x^2 - 2x + 7$$

$$A_{24}(x) = -3x^2 + 2x - 9$$

$$A_{25}(x) = 4x^2 - 7x + 2$$

$$A_{26}(x) = -16x^2 + 16x - 4$$

$$A_{27}(x) = 20x^2 - 4x + \frac{1}{5}$$

$$A_{28}(x) = 2x^3 - 7x^2 + 4x - 3$$

$$A_{29}(x) = 9x^3 + 6x^2 - 57x + 18$$

$$A_{30}(x) = -3x^3 + 20x^2 - 32x + 35$$

$$A_{31}(x) = 3x^2 - 30x + 63$$

$$A_{32}(x) = -6x^2 - x + 2$$

$$A_{33}(x) = 4x^2 - 3x + 2$$

$$A_{34}(x) = -2x^2 + 3x - 5$$

$$A_{35}(x) = 5x^2 + 7x - 3$$

$$A_{36}(x) = -4x^2 + 20x - 25$$

$$A_{37}(x) = 4x^2 - 6x + \frac{9}{4}$$

$$A_{38}(x) = 2x^3 + 5x^2 + 3x + 2$$

$$A_{39}(x) = 10x^3 - 35x^2 - 35x + 150$$

$$A_{40}(x) = -4x^3 - 6x^2 - x - 10$$

$$A_{41}(x) = 4x^2 + 4x - 48$$

$$A_{42}(x) = -5x^2 + 23x + 10$$

$$A_{43}(x) = 5x^2 - 3x + 3$$

$$A_{44}(x) = -3x^2 + 4x - 6$$

$$A_{45}(x) = 2x^2 - 9x - 3$$

$$A_{46}(x) = -9x^2 + 12x - 4$$

$$A_{47}(x) = 28x^2 + 4x + \frac{1}{7}$$

$$A_{48}(x) = 3x^3 - 13x^2 + 6x - 8$$

$$A_{49}(x) = 9x^3 + 3x^2 - 186x + 120$$

$$A_{50}(x) = -3x^3 + 13x^2 - 17x + 15$$

$$A_{51}(x) = 3x^2 + 3x - 6$$

$$A_{52}(x) = -6x^2 - 7x + 3$$

$$A_{53}(x) = 3x^2 - x + 2$$

$$A_{54}(x) = -4x^2 + 5x - 7$$

$$A_{55}(x) = 2x^2 + 5x - 4$$

$$A_{56}(x) = -5x^2 + 3x - 1$$

$$A_{57}(x) = 3x^2 - 2x + \frac{1}{3}$$

$$A_{58}(x) = x^3 + 3x^2 + 4x + 2$$

$$A_{59}(x) = 2x^3 - x^2 - 5x - 2$$

$$A_{60}(x) = -2x^3 - x^2 + 8x - 21$$

$$A_{61}(x) = 5x^2 - 10x - 15$$

$$A_{62}(x) = -8x^2 + 2x + 21$$

$$A_{63}(x) = 2x^2 - 5x + 7$$

$$A_{64}(x) = -3x^2 + 7x - 8$$

$$A_{65}(x) = 3x^2 - 2x - 7$$

$$A_{66}(x) = -8x^2 + 5x - 3$$

$$A_{67}(x) = 4x^2 - 6x + \frac{9}{4}$$

$$A_{68}(x) = x^3 + 5x^2 + 11x + 10$$

$$A_{69}(x) = 3x^3 - x^2 - 20x - 12$$

$$A_{70}(x) = -3x^3 + 8x^2 - 8x + 8$$

$$A_{71}(x) = 2x^2 - 2x - 40$$

$$A_{72}(x) = -10x^2 - 31x + 14$$

$$A_{73}(x) = 4x^2 - 5x + 3$$

$$A_{74}(x) = -2x^2 + 3x - 5$$

$$A_{75}(x) = 4x^2 - 7x - 2$$

$$A_{76}(x) = -8x^2 + 3x - 1$$

$$A_{77}(x) = 5x^2 - 8x + \frac{16}{5}$$

$$A_{78}(x) = x^3 + 2x^2 - 3x - 10$$

$$A_{79}(x) = 4x^3 + 7x^2 - 21x - 18$$

$$A_{80}(x) = -2x^3 - 5x^2 - x - 12$$

$$A_{81}(x) = 5x^2 - 5x - 30$$

$$A_{82}(x) = -21x^2 - x + 2$$

$$A_{83}(x) = 5x^2 - 3x + 1$$

$$A_{84}(x) = -4x^2 + 8x - 5$$

$$A_{85}(x) = 5x^2 - 9x + 2$$

$$A_{86}(x) = -9x^2 + 4x - 1$$

$$A_{87}(x) = x^2 + 7x + \frac{49}{4}$$

$$A_{88}(x) = x^3 + 11x^2 + 41x + 52$$

$$A_{89}(x) = 3x^3 + 10x^2 - 9x - 4$$

$$A_{90}(x) = -4x^3 + 11x^2 - 13x + 14$$

$$A_{91}(x) = 4x^2 + 24x - 28$$

$$A_{92}(x) = -21x^2 + 13x - 2$$

$$A_{93}(x) = 7x^2 + 2x + 1$$

$$A_{94}(x) = -3x^2 + 5x - 7$$

$$A_{95}(x) = 3x^2 + 8x + 2$$

$$A_{96}(x) = -7x^2 + 6x - 2$$

$$A_{97}(x) = 7x^2 - 4x + \frac{4}{7}$$

$$A_{98}(x) = x^3 + 6x^2 + 14x + 15$$

$$A_{99}(x) = 7x^3 - 9x^2 - 40x + 12$$

$$A_{100}(x) = -3x^3 - 7x^2 + 15x - 20$$

5.6 - Inéquations

Résoudre les inéquations suivantes :

$$(I_1) : 2x^2 - 5x - 3 > 0$$

$$(I_2) : 8x^2 - 6x - 9 \leq 0$$

$$(I_3) : -3x^2 + 13x - 4 > 0$$

$$(I_4) : -6x^2 + 19x - 10 \leq 0$$

$$(I_5) : 25x^2 + 30x + 9 \geq 0$$

$$(I_6) : 9x^2 - 6x + 1 \leq 0$$

$$(I_7) : 4x^2 + 4x + 6 > 0$$

$$(I_8) : -16x^2 + 8x - 8 > 0$$

$$(I_9) : 2x^3 - 3x^2 - x - 2 < 0$$

$$(I_{10}) : -15x^3 + 44x^2 + 5x - 6 < 0$$

$$(I_{11}) : 4x^2 - 6x - 4 > 0$$

$$(I_{12}) : 3x^2 - 16x - 35 \leq 0$$

$$(I_{13}) : -4x^2 - 4x + 3 > 0$$

$$(I_{14}) : -8x^2 - 2x + 15 \leq 0$$

$$(I_{15}) : 49x^2 - 42x + 9 \geq 0$$

$$(I_{16}) : 16x^2 - 24x + 9 \leq 0$$

$$(I_{17}) : 9x^2 - 6x + 9 > 0$$

$$(I_{18}) : -4x^2 - 12x - 11 > 0$$

$$(I_{19}) : 3x^3 - 5x^2 + 9x - 7 < 0$$

$$(I_{20}) : -12x^3 - 17x^2 - 3x + 2 < 0$$

$$(I_{21}) : 14x^2 - 5x - 1 > 0$$

$$(I_{22}) : 12x^2 - 5x - 2 \leq 0$$

$$(I_{23}) : -10x^2 - x + 2 > 0$$

$$(I_{24}) : -14x^2 - 33x + 5 \leq 0$$

$$(I_{25}) : 9x^2 - 42x + 49 \geq 0$$

$$(I_{26}) : 25x^2 - 10x + 1 \leq 0$$

$$(I_{27}) : 4x^2 - 12x + 14 > 0$$

$$(I_{28}) : -9x^2 + 6x - 6 > 0$$

$$(I_{29}) : 4x^3 + 5x^2 - x + 10 < 0$$

$$(I_{30}) : -6x^3 + 31x^2 - 45x + 18 > 0$$

$$(I_{31}) : 3x^2 - 10x - 8 > 0$$

$$(I_{32}) : 15x^2 + 17x - 4 \leq 0$$

$$(I_{33}) : -14x^2 - x + 3 > 0$$

$$(I_{34}) : -20x^2 + 11x + 3 \leq 0$$

$$(I_{35}) : 16x^2 - 56x + 49 \geq 0$$

$$(I_{36}) : 4x^2 + 12x + 9 \leq 0$$

$$(I_{37}) : 25x^2 + 30x + 13 > 0$$

$$(I_{38}) : -4x^2 + 20x - 28 > 0$$

$$(I_{39}) : 3x^3 - 8x^2 - x - 6 < 0$$

$$(I_{40}) : -12x^3 + 41x^2 + 40x - 48 < 0$$

$$(I_{41}) : 5x^2 + 32x - 21 > 0$$

$$(I_{42}) : 8x^2 - 14x - 15 \leq 0$$

$$(I_{43}) : -12x^2 + 41x - 24 > 0$$

$$(I_{44}) : -14x^2 + 45x + 14 \leq 0$$

$$(I_{45}) : 16x^2 - 40x + 25 \geq 0$$

$$(I_{46}) : 9x^2 - 24x + 16 \leq 0$$

$$(I_{47}) : 4x^2 + 20x + 34 > 0$$

$$(I_{48}) : -9x^2 + 12x - 5 > 0$$

$$(I_{49}) : 2x^3 + 11x^2 + 17x + 20 < 0$$

$$(I_{50}) : -28x^3 + 81x^2 - 53x + 6 > 0$$

$$(I_{51}) : 8x^2 + 10x + 3 > 0$$

$$(I_{52}) : 14x^2 - 29x - 15 \leq 0$$

$$(I_{53}) : -15x^2 + 14x + 8 > 0$$

$$(I_{54}) : -12x^2 + 13x - 3 \leq 0$$

$$(I_{55}) : 4x^2 + 36x + 81 \geq 0$$

$$(I_{56}) : 25x^2 - 30x + 9 \leq 0$$

$$(I_{57}) : 9x^2 + 42x + 58 > 0$$

$$(I_{58}) : -16x^2 + 8x - 8 > 0$$

$$(I_{59}) : 5x^3 - 11x^2 - 30x - 24 < 0$$

$$(I_{60}) : -3x^3 - 10x^2 - x + 6 < 0$$

$$(I_{61}) : 6x^2 + 16x - 32 > 0$$

$$(I_{62}) : 12x^2 + 7x - 10 \leq 0$$

$$(I_{63}) : -35x^2 + 16x + 3 > 0$$

$$(I_{64}) : -6x^2 + 31x - 40 \leq 0$$

$$(I_{65}) : 16x^2 + 24x + 9 \geq 0$$

$$(I_{66}) : 36x^2 - 60x + 25 \leq 0$$

$$(I_{67}) : 25x^2 - 20x + 9 > 0$$

$$(I_{68}) : -9x^2 + 6x - 6 > 0$$

$$(I_{69}) : 3x^3 - 7x^2 - 4x - 6 < 0$$

$$(I_{70}) : -8x^3 - 18x^2 - 7x + 3 < 0$$

$$(I_{71}) : 6x^2 + 17x - 14 > 0$$

$$(I_{72}) : 10x^2 - x - 3 \leq 0$$

$$(I_{73}) : -12x^2 + 35x - 8 > 0$$

$$(I_{74}) : -18x^2 + 6x + 4 \leq 0$$

$$(I_{75}) : 25x^2 - 10x + 1 \geq 0$$

$$(I_{76}) : 49x^2 - 42x + 9 \leq 0$$

$$(I_{77}) : 16x^2 - 8x + 10 > 0$$

$$(I_{78}) : -25x^2 - 20x - 11 > 0$$

$$(I_{79}) : 4x^3 + 11x^2 - 13x + 28 < 0$$

$$(I_{80}) : -12x^3 + 19x^2 + 12x - 4 < 0$$

$$(I_{81}) : 20x^2 - 7x - 6 > 0$$

$$(I_{82}) : 6x^2 - 23x + 20 \leq 0$$

$$(I_{83}) : -21x^2 + 38x - 5 > 0$$

$$(I_{84}) : -8x^2 - 2x + 15 \leq 0$$

$$(I_{85}) : 16x^2 + 48x + 36 \geq 0$$

$$(I_{86}) : 81x^2 - 36x + 4 \leq 0$$

$$(I_{87}) : 25x^2 - 70x + 59 > 0$$

$$(I_{88}) : -16x^2 + 8x - 8 > 0$$

$$(I_{89}) : 5x^3 - 12x^2 - 7x - 6 < 0$$

$$(I_{90}) : -28x^3 - 69x^2 - 20x + 12 < 0$$

$$(I_{91}) : 10x^2 + 33x - 7 > 0$$

$$(I_{92}) : 12x^2 - 17x - 40 \leq 0$$

$$(I_{93}) : -20x^2 + 17x - 3 > 0$$

$$(I_{94}) : -21x^2 + 10x - 1 \leq 0$$

$$(I_{95}) : 25x^2 - 70x + 49 \geq 0$$

$$(I_{96}) : 36x^2 + 60x + 25 \leq 0$$

$$(I_{97}) : 4x^2 - 20x + 32 > 0$$

$$(I_{98}) : -9x^2 + 12x - 12 > 0$$

$$(I_{99}) : x^3 + 7x^2 + 13x + 15 < 0$$

$$(I_{100}) : -24x^3 - 5x^2 + 81x - 10 < 0$$