

**ESERCIZI IN PIÙ****LE DISEQUAZIONI FRATTE**

Risolvi le seguenti disequazioni:

$$1 \quad \frac{4x-4}{x^2-4} + \frac{18}{x} - \frac{9}{x-2} - \frac{3}{x+2} + 2 \geq 0 \quad [x \leq -6 \vee 0 < x < 2 \vee x \geq 3]$$

$$2 \quad 13 + \frac{4}{x} + \frac{1}{x+1} < \frac{2x}{(x+1)(x-1)} - \frac{4x^2-23}{1-x} \quad \left[ -1 < x < 0 \vee \frac{1}{4} < x < 1 \vee x > 4 \right]$$

$$3 \quad \frac{7(7x+1)}{x^2+x+1} + 40 \left( \frac{2}{x+1} - \frac{5}{x+2} \right) + \frac{4}{x+1} + 6 \leq 0 \quad \left[ -2 < x < -1 \vee -\frac{1}{3} \leq x \leq \frac{1}{2} \vee 1 \leq x \leq 6 \right]$$

$$4 \quad (a+1)(x-2a) + 2(a-1) \left( \frac{a^2+2a}{x+a} + \frac{1}{x-1} \right) \geq 0 \quad (a > 0)$$

$[0 < a < 1, -1 \leq x < -a \vee a \leq x < 1 \vee x \geq 2; a = 1, x \geq 2; 1 < a < 2, -a < x \leq -1 \vee 1 < x \leq a \vee x \geq 2;$   
 $a = 2, -2 < x \leq -1 \vee x > 1; a > 2, -a < x \leq -1 \vee 1 < x \leq 2 \vee x \geq a]$

$$5 \quad \frac{a}{x} + 2a < \frac{(a+2)^2}{2x+1} \quad (a > 0)$$

$\left[ 0 < a < 2: -\frac{1}{2} < x < 0 \vee \frac{a}{4} < x < \frac{1}{a}; a = 2: -\frac{1}{2} < x < 0; a > 2: -\frac{1}{2} < x < 0 \vee \frac{1}{a} < x < \frac{a}{4} \right]$

$$6 \quad \frac{x^3-8}{x^4-4x^2+3} \leq 0 \quad [x < -\sqrt{3} \vee -1 < x < 1 \vee \sqrt{3} < x \leq 2]$$

$$7 \quad \frac{(x+1)(x-4)}{x^4-x^3-3x^2+3x} \leq 0 \quad [-\sqrt{3} < x \leq -1 \vee 0 < x < 1 \vee \sqrt{3} < x \leq 4]$$

$$8 \quad \frac{(x^4-16)(27-x^3)}{-6x+x^2(x-1)+3x^2+7(x+2)-14} > 0 \quad [-2 < x < -1 \vee -1 < x < 0 \vee 2 < x < 3]$$

$$9 \quad \frac{x^3-3x^6}{x^4-5x^2+7} \geq 0 \quad \left[ 0 \leq x \leq \frac{1}{\sqrt[3]{3}} \right]$$

$$10 \quad \frac{x^6-10x^3+16}{x^4-3x^3+2x^2} \geq 0 \quad [x < 0 \vee 0 < x < 1 \vee x \geq \sqrt[3]{2}]$$

$$11 \quad \frac{x^4-x^3-3x^2+3x}{x^2-3x-4} \leq 0 \quad [-\sqrt{3} \leq x < -1 \vee 0 \leq x \leq 1 \vee \sqrt{3} \leq x < 4]$$

$$12 \quad \frac{3x-4}{4x} - \frac{x^2+1}{2x^2} - \frac{x-5}{5x} < 0 \quad [-\sqrt{10} < x < 0 \vee 0 < x < \sqrt{10}]$$