Liceo Scientifico Statale "S. Cannizzaro" – Palermo – Classe III D
ESERCITAZIONE SU EQUAZIONI E DISEQUAZIONI

ESERCIZIO 1. Risolvere le seguenti equazioni.

EQUAZIONE	INSIEME DI RISOLUZIONE	SOLUZIONI
a) $5x^4 - 48 = 0$	$\mathbb{C}$	$S = \left\{\pm\sqrt[4]{\frac{48}{5}}, \pm\sqrt[4]{\frac{48}{5}}i\right\}$
b) $18x^4 = 16$	$\mathbb{C}$	$S = \left\{\pm\frac{2}{3}, \pm\frac{2}{3}i\right\}$
c) $\left(x + \frac{1}{x}\right)^2 = \frac{25}{4}$	$\mathbb{R}$	$S = \left\{-2{,}2, -\frac{1}{2}, \frac{1}{2}\right\}$
d) $\left(x + \frac{1}{x}\right)^4 + 5\left(x + \frac{1}{x}\right)^2 + 6 = 0$	$\mathbb{R}$	$S = \emptyset$
e) $(x^2 + 2)^2 - (x^2 + 2) + 18 = 0$	$\mathbb{R}$	$S = \{-2, -1{,}1{,}2\}$
f) $18x^{10} - 18x^5 + 5 = 0$	$\mathbb{R}$	$S = \emptyset$
g) $x^8 + 2x^4 - 3 = 0$	$\mathbb{R}$	$S = \{-1{,}1\}$
h) $x^3 - x^2 - 9x + 9 = 0$	$\mathbb{R}$	$S = \{-3{,}1{,}3\}$
i) $x^5 - 4x^4 - x + 4$	$\mathbb{C}$	$S = \{\pm 1, \pm i, 4\}$
j) $\sqrt{2}x^4 - \sqrt{32} = 0$	$\mathbb{C}$	$S = \{\pm\sqrt{2}, \pm\sqrt{2}i\}$
k) $(4x^2 - 3)^4 - (4x^2 - 3)^2 - 12 = 0$	$\mathbb{R}$	$S = \left\{\pm\sqrt{\frac{5}{4}}, \pm\frac{1}{2}\right\}$
l) $\left(\frac{x^2+2}{x^2}\right)^4 - 3\left(\frac{x^2+2}{x^2}\right)^2 - 4 = 0$	$\mathbb{R}$	$S = \{\pm\sqrt{2}\}$
m) $2x^3 + x^2 - 2\sqrt{3}x - \sqrt{3} = 0$	$\mathbb{R}$	$S = \left\{\pm\sqrt[3]{3}, -\frac{1}{2}\right\}$
n) $x^4 - 2\sqrt{2}x^3 + 2\sqrt{2}x - 1 = 0$	$\mathbb{R}$	$S = \{\sqrt{2} \pm 1, \pm 1\}$

ESERCIZIO 2. Risolvere le seguenti equazioni.

EQUAZIONE	SOLUZIONI
a) $x^3 - 4x^2 - 4x + 16 = 0$	$S = \{-2{,}2{,}4\}$
b) $x^3 - 6x^2 + 11x - 6 = 0$	$S = \{1{,}2{,}3\}$
c) $x^4 - 5x^3 + 2x^2 + 20x - 24 = 0$	$S = \{-2{,}2{,}3\}$
d) $x^6 - 26x^3 - 27 = 0$	$S = \{-1{,}3\}$
e) $x^8 - 17x^4 + 16 = 0$	$S = \{-2, -1{,}1{,}2\}$

ESERCIZIO 3. Risolvere le seguenti equazioni.

a) $x^3 - x^2 + x - 1 = 0$
b) $2x^4 + 3x^3 - 4x^2 - 3x + 2 = 0$
c) $8x^6 - 7x^3 - 1 = 0$
d) $8x^3 - 1 = 0$
e) $9x^2 + 1 = (3 - x^2) \cdot (x^2 + 4)$
f) $x^5 - 81x = 0$
g) $(2x + 5)^3 = 27$
h) $x^6 - 64 = 0$

ESERCIZIO 4. Risolvere le seguenti disequazioni.

DISEQUAZIONE	SOLUZIONI
a) $5x^2 - 7x + 10 \leq 0$	$S = \emptyset$
b) $x^2 + 10x + 25 \leq 0$	$S = \{5\}$
c) $\frac{5+3x^2}{6} \geq \frac{1}{4}\left(3 + \frac{1}{3} + 2x^2\right) - \frac{x^2-4}{3}$	$S =]-\infty, -2] \cup [2, +\infty[$
d) $x^2 < 2\left(3\sqrt{2}x - 8\right)$	$S =]2\sqrt{2}, 4\sqrt{2}[$
e) $x^2 + \sqrt{7}x - 14 \geq 0 = 0$	$S =]-\infty, -2\sqrt{7}] \cup [\sqrt{7}, +\infty[$
f) $\frac{2}{x^2+1} - 1 > 0$	$S =]-1,1[$
g) $\frac{x^2-4}{3x} - \frac{1}{x} \leq \frac{1}{2} - \frac{2}{x}$	$S = \left]-\infty, -\frac{1}{2}\right] \cup]0,2]$
h) $\frac{x}{x+2} < 5 + \frac{x}{x-3}$	$S =]-\infty, -\sqrt{6}[\cup]-2, \sqrt{6}[\cup]3, +\infty[$
i) $\frac{1}{x^2-5x+6} - \frac{x+2}{x-2} \geq \frac{x+3}{x-3}$	$S = \left[-\sqrt{\frac{13}{2}}, 2\right[\cup \left[\sqrt{\frac{13}{2}}, 3\right[$
j) $x^3 - 2x^2 - 3x > 0$	$S =]-1,0[\cup]3, +\infty[$
k) $2x^3 - 13x^2 - 8x + 7 < 0$	$S =]-\infty, -1[\cup \left]\frac{1}{2}, 7\right[$
l) $2x^4 + x^3 - 5x^2 - 2x + 2 > 0$	$S =]-\infty, -\sqrt{2}[\cup \left]-1, \frac{1}{2}\right[\cup]\sqrt{2}, +\infty[$
m) $(x-1)^2 > \frac{2}{x+2}$	$S =]-\infty, -2[\cup]-\sqrt{3}, 0[\cup]\sqrt{3}, +\infty[$
n) $x^4 - x^3 - x^2 - x - 2 > 0$	$S =]-\infty, -1[\cup]2, +\infty[$
o) $\frac{x^2-x-2}{x^3-3x+2} \geq 0$	$S =]-2, -1] \cup [2, +\infty[$
p) $x^3 + 2 > 0$	$S =]-\sqrt[3]{2}, +\infty[$
q) $x^3 - 8 \leq 0$	$S =]-\infty, 2]$
r) $32x^5 - 1 > 0$	$S = \left]\frac{1}{2}, +\infty\right[$
s) $\frac{x-3}{x^3-8} \geq 0$	$S =]-\infty, 2[\cup [3, +\infty[$
t) $\frac{2x-3}{8x^3+27} < 0$	$S = \left]-\frac{3}{2}, \frac{3}{2}\right[$
u) $x^4 + 7x^2 - 8 < 0$	$S =]-1,1[$
v) $x^6 - 7x^3 - 8 < 0$	$S =]-1,2[$
w) $x^4 - 5x^2 + 4 > 0$	$S =]-\infty, -2[\cup]-1,1[\cup]2, +\infty[$

Esercizio 5. Risolvere le seguenti equazioni.

a) $3x^4 - 6x^3 = 0$
b) $x^4 - 9x^2 + 18 = 0$
c) $x^4 - x^2 + 10 = 0$
d) $x^5 - 8x^2 = 0$
e) $3x^6 - x^3 - 2 = 0$
f) $x^4 - 16 = 0$
g) $x^4 - x^2 - 12 = 0$
h) $(x^2-3)^2 - 3(x^2-3) - 4 = 0$
i) $x^6 - 5x^3 + 6 = 0$
j) $\frac{2x-5}{x^2-4x} = -\frac{2}{x-4}$

Esercizio 6. Risolvere le seguenti equazioni.

a) $x^3 + 2x^2 - 3x < 0$
b) $(x-1)(x^2+1)(x^3-4x) > 0$
c) $\frac{2x-5}{x^2-4x} < -\frac{2}{x-4}$
d) $\frac{x-5}{x-1} < -2$
e) $2x^3 + x^2 - 13x + 6 \geq 0$
f) $x^2 - 10x + 32 < 0$
g) $15 - x - 2x^2 > 0$
h) $\frac{x^2}{4} - x < \frac{21}{4}$
i) $3x(x-2) > x^2$
j) $x^2 - 3x + 4 < 0$
k) $x^2 + 2x - 1 \leq 0$
l) $x^2 - 2x + 1 > 0$
m) $-x^2 - 1 < 0$
n) $6x^2 - 13x + 6 \leq 0$
o) $x^2 - 3\sqrt{2}x + 4 < 0$
p) $2x^2 - x^3 \leq 0$
q) $x^4(x+1) > 0$
r) $(2x+1)^2(x^2+5) > 0$
s) $(x-3)^4(x+8)^3 > 0$
t) $x^2(1-x^2) \leq 0$
u) $\frac{x+1}{x-1} + \frac{x-1}{x+1} > \frac{1}{1-x^2}$
v) $\frac{3x-1}{3x+1} - 1 > \frac{3x+1}{1-3x}$
w) $\frac{x^2+1}{x-1} - \frac{2x^2-1}{x+1} \geq \frac{x^3}{x^2-1}$
x) $\frac{x-13}{(x-5)(x+3)} \geq \frac{2x-1}{x^2-2x-15}$
y) $\frac{x-2}{x-3} + \frac{x-3}{x-4} < \frac{19-2x}{x^2-7x+12}$
z) $\frac{x^2-1}{x^2-6x+5} - \frac{1}{x-5} \geq \frac{1}{1-x}$
aa) $\frac{5x+3}{1-2x} \leq \frac{x-1}{2x+1} - \frac{4-x}{4x^2-1}$