2/5/2022

**71** $|2x^2 - x| = x^2 + 2x$

$$\begin{cases} x^2+2x \geq 0 \rightarrow x(x+2) \geq 0 \rightarrow x \leq -2 \vee x \geq 0 \\ 2x^2 - x = \pm (x^2+2x) \end{cases}$$

① $\begin{cases} x \leq -2 \vee x \geq 0 \\ 2x^2 - x = x^2 + 2x \end{cases}$

$\vee$

② $\begin{cases} x \leq -2 \vee x \geq 0 \\ 2x^2 - x = -x^2 - 2x \end{cases}$

① $\begin{cases} x \leq -2 \vee x \geq 0 \\ x^2 - 3x = 0 \end{cases}$

$x(x-3) = 0$

$x = 0 \vee x = 3$

② $\begin{cases} x \leq -2 \vee x \geq 0 \\ 3x^2 + x = 0 \end{cases}$

$x(3x+1) = 0$

$x = 0 \vee x = -\frac{1}{3}$ N.ACC.

$$\boxed{x = 0 \vee x = 3}$$

**92** $|x+2| = |3-2x|$ $\left[\frac{1}{3}; 5\right]$

É del tip $|f(x)| = |g(x)|$

$\Downarrow$

$f(x) = \pm g(x)$

$\swarrow$

$f(x) = g(x) \quad \vee \quad f(x) = -g(x)$

$x+2 = \pm(3-2x)$

$x+2 = 3-2x \quad \vee \quad x+2 = -3+2x$

$3x = 1 \qquad -x = -5$

$\boxed{x = \frac{1}{3} \quad \vee \quad x = 5}$

**104** $|x^3 - 4x| = |x+2|$ $[-2; 1; 1 \pm \sqrt{2}]$

$x^3 - 4x = \pm(x+2)$

$x^3 - 4x = x+2 \quad \vee \quad x^3 - 4x = -x-2$

$x^3 - 4x - x - 2 = 0 \quad \vee \quad x^3 - 4x + x + 2 = 0$

① $x^3 - 5x - 2 = 0 \quad \vee$ ② $x^3 - 3x + 2 = 0$

① $x^3 - 5x - 2 = 0$

$-2 \mapsto -8 + 10 - 2 = 0$ OK

| | 1 | 0 | -5 | -2 |
|---|---|---|---|---|
| -2 | | -2 | 4 | 2 |
| | 1 | -2 | -1 | // |

$(x+2)(x^2 - 2x - 1) = 0$

$(x+2)(x^2-2x-1)=0$

$x^2-2x-1=0 \qquad x=1\pm\sqrt{2}$

$\frac{\Delta}{4}=1+1=2$

$x=-2 \ \vee \ x=1\pm\sqrt{2}$

② $x^3-3x+2=0$

$1 \mapsto 1-3+2=0$

OR

| | 1 | 0 | −3 | 2 |
|---|---|---|---|---|
| 1 | | 1 | 1 | −2 |
| | 1 | 1 | −2 | // |

$(x^2+x-2)(x-1)=0$ → $(x+2)(x-1)^2=0$

$x^2+x-2=0$

$\Delta=1+8=9 \qquad x=\frac{-1\pm3}{2}=\begin{cases}-2\\1\end{cases}$

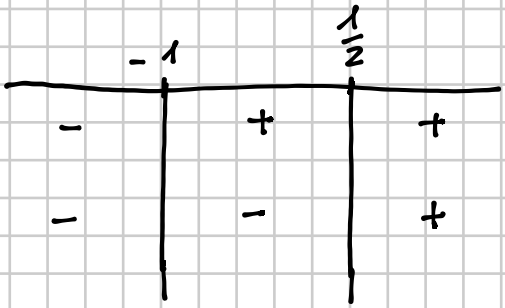
$x=-2 \ \vee \ x=1$

Soluzione finale: $\boxed{x=-2 \ \vee \ x=1 \ \vee \ x=1\pm\sqrt{2}}$

**110** $|x+1|+|2x-1|=3$ $[-1;1]$

$x+1>0$ $\quad x>-1$

$2x-1>0$ $\quad x>\frac{1}{2}$




① $\begin{cases} x<-1 \\ -(x+1)-(2x-1)=3 \end{cases}$

② $\begin{cases} -1\le x<\frac{1}{2} \\ x+1-(2x-1)=3 \end{cases}$

③ $\begin{cases} x\ge\frac{1}{2} \\ x+1+2x-1=3 \end{cases}$

$\begin{cases} x<-1 \\ -x-1-2x+1=3 \end{cases}$ $\vee$ $\begin{cases} -1\le x<\frac{1}{2} \\ x+1-2x+1=3 \end{cases}$ $\vee$ $\begin{cases} x\ge\frac{1}{2} \\ 3x=3 \end{cases}$

$\begin{cases} x<-1 \\ -3x=3 \end{cases}$ $\vee$ $\begin{cases} -1\le x<\frac{1}{2} \\ -x=1 \end{cases}$ $\vee$ $\begin{cases} x\ge\frac{1}{2} \\ x=1 \end{cases}$

$\begin{cases} x<-1 \\ x=-1 \end{cases}$ $\vee$ $\begin{cases} -1\le x<\frac{1}{2} \\ x=-1 \end{cases}$ $\vee$ $\begin{cases} x\ge\frac{1}{2} \\ x=1 \end{cases}$

$\emptyset$ $\qquad x=-1$ $\qquad x=1$

$$\boxed{x=-1 \ \vee \ x=1}$$

**120** $|x-2|+|x^2-1|=2-x$ $[-1;1]$

$x-2>0 \quad x>2$

$x^2-1>0 \quad x<-1 \vee x>1$

| | $-1$ | | $1$ | | $2$ | |
|---|---|---|---|---|---|---|
| $x-2$ | $-$ | | $-$ | | $-$ | $+$ |
| $x^2-1$ | $+$ | | $-$ | | $+$ | $+$ |

① $\begin{cases} x<-1 \\ -(x-2)+(x^2-1)=2-x \end{cases}$

② $\begin{cases} -1\le x<1 \\ -(x-2)-(x^2-1)=2-x \end{cases}$

③ $\begin{cases} 1\le x<2 \\ -(x-2)+(x^2-1)=2-x \end{cases}$

④ $\begin{cases} x\ge 2 \\ (x-2)+(x^2-1)=2-x \end{cases}$

① $\begin{cases} x<-1 \\ -x+2+x^2-1=2-x \end{cases}$ $\begin{cases} x<-1 \\ x^2=1 \end{cases}$ $\begin{cases} x<-1 \\ x=\pm 1 \end{cases}$ $\varnothing$

② $\begin{cases} -1\le x<1 \\ -(x-2)-(x^2-1)=2-x \end{cases}$ $\begin{cases} -1\le x<1 \\ -x+2-x^2+1=2-x \end{cases}$ $\begin{cases} -1\le x<1 \\ x=\pm 1 \end{cases}$

$x=-1$

③ $\begin{cases} 1\le x<2 \\ x=\pm 1 \end{cases}$ $x=1$

↑ come la ①

④ $\begin{cases} x \geq 2 \\ (x-2)+(x^2-1) = 2-x \end{cases}$

$\begin{cases} x \geq 2 \\ x-2+x^2-1 = 2-x \end{cases}$ $\quad$ $\begin{cases} x \geq 2 \\ x^2+2x-5 = 0 \end{cases}$ $\quad \varnothing$

$\frac{\Delta}{4} = 1+5 = 6 \qquad x = -1 \pm \sqrt{6}$

$x = -1-\sqrt{6}$ N. ACC. $\quad \vee \quad x = -1+\sqrt{6}$ N. ACC.

Unendo le soluzioni trovate

$\boxed{x = \pm 1}$