$$x^2-(2+\sqrt{3})x+2\sqrt{3}=0$$

$$\Delta=(2+\sqrt{3})^2-8\sqrt{3}=$$

$$=4+3+4\sqrt{3}-8\sqrt{3}=$$

$$=4+3-4\sqrt{3}=(2-\sqrt{3})^2$$

$$x_{1,2}=\frac{2+\sqrt{3}\pm(2-\sqrt{3})}{2}$$

$$x_1=\frac{2+\cancel{\sqrt{3}}+2-\cancel{\sqrt{3}}}{2}=\frac{4}{2}=2$$

$$x_2=\frac{\cancel{2}+\sqrt{3}-\cancel{2}+\sqrt{3}}{2}=\frac{\cancel{2}\sqrt{3}}{\cancel{2}}=\sqrt{3}$$

$$(3b-1)x^2 - 4(3b-1)x + 12b = 0$$

$$\frac{\Delta}{4} = 4(3b-1)^2 - 12b(3b-1) =$$

$$= 4(9b^2 - 6b + 1) - 36b^2 + 12b =$$

$$= \cancel{36b^2} - 24b + 4 - \cancel{36b^2} + 12b =$$

$$= -12b + 4$$

$$\frac{\Delta}{4} \geq 0 \qquad -12b + 4 \geq 0 \ ; \quad -12b \geq -4$$

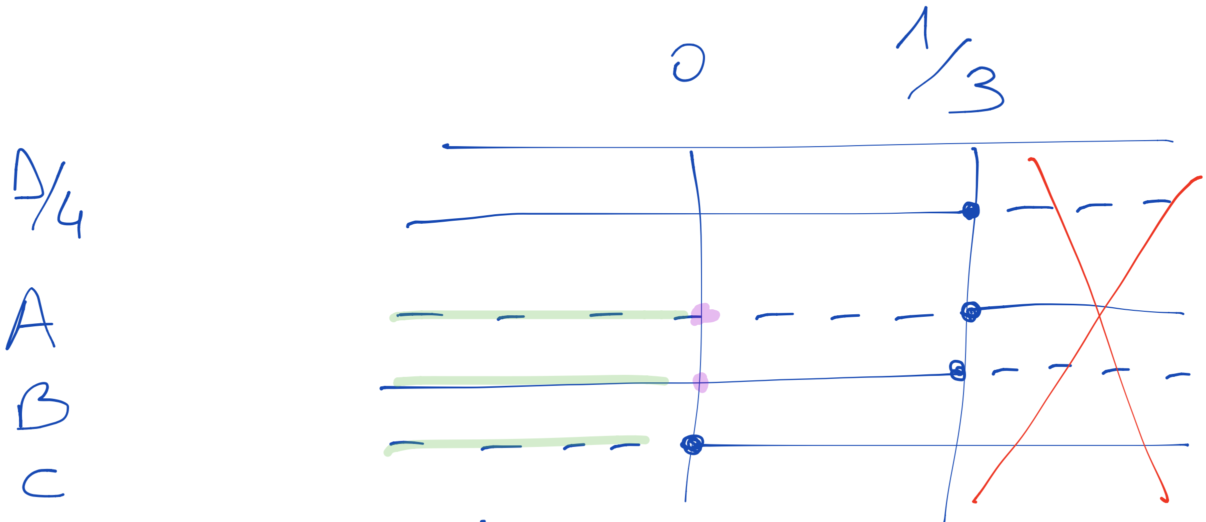
$$b \leq 1/3$$

$$A \geq 0 \qquad 3b - 1 \geq 0 \ ; \quad b \geq 1/3$$

$$B \geq 0 \qquad -4(3b-1) \geq 0 \ ; \quad 3b - 1 \leq 0$$

$$b \leq 1/3$$

$$C \geq 0 \qquad 12b \geq 0 \ ; \quad b \geq 0$$



Se $b<0$ l'eq. ammette due soluzioni reali distinte con $x_1>0$, $x_2>0$.

Se $b=0$ l'eq. è incompleta spuria e ammette le soluzioni $x_1=0$, $x_2>0$

Se $0<b<1/3$ l'eq. ammette due radici reali $x_1 \neq x_2$ con $x_1>0$, $x_2<0$

Se $b = 1/3$ l'eq. diventa

$$12 \cdot \frac{1}{3} = 0 \Rightarrow 4 = 0$$

è impossibile

$$\frac{6a^2 + 29a - 5}{15a + 3a^2}$$

N: $6a^2 + 29a - 5 = 0$

$\Delta = 841 + 120 = 961 = 31^2$

$$a = \frac{-29 \pm 31}{12} \begin{cases} \frac{-60}{12} = -5 \\ +\frac{2}{12} = +1/6 \end{cases}$$

$$6\left(a - \frac{1}{6}\right)(a+5) = (6a-1)(a+5)$$

D: $3a^2 + 15a = 3a(a+5)$

$$\frac{(6a-1)\cancel{(a+5)}}{3a\cancel{(a+5)}} = \frac{6a-1}{3a}$$

$a \neq 0$

$a \neq -5$

$x^2 + \cancel{7k^2} - 2\sqrt{7}\,kx = 0$

$x^2 - 2\sqrt{7}k\,x + 7k^2 = 0$

$(x - \sqrt{7}k)^2 = 0$

$(x - \sqrt{7}k)^2 = 0$

$(x - \sqrt{7}k)(x - \sqrt{7}k) = 0$

$x = \sqrt{7}k \qquad x = \sqrt{7}k$

$$x^2 - 2(k-4)x + 2k + 7 = 0$$

$$x_1 = -2$$

$$(-2)^2 - 2(k-4)(-2) + 2k + 7 = 0$$

$$4 + 4k - 16 + 2k + 7 = 0$$

$$6k = 5 \; ; \; k = 5/6$$

$$x_1 = \frac{1}{2} \qquad x_2 = \frac{1}{4}$$

$$S = x_1 + x_2 = \frac{1}{2} + \frac{1}{4} = \frac{2+1}{4} = \frac{3}{4}$$

$$p = x_1 x_2 = \frac{1}{2} \cdot \frac{1}{4} = \frac{1}{8}$$

$$x^2 - Sx + p = 0 \qquad x^2 - \frac{3}{4}x + \frac{1}{8} = 0$$

$$8x^2 - 6x + 1 = 0$$

$$\left(x-\frac{1}{2}\right)\left(x-\frac{1}{4}\right)=0$$

$$\downarrow \qquad \downarrow$$

$$x=\frac{1}{2} \qquad x=\frac{1}{4}$$

$$(2-k)x^2+2kx+1=0 \qquad k\neq 2$$

$$\frac{\Delta}{4}=k^2-2+k=k^2+k-2$$

$$S=-\frac{2k}{2-k}=\frac{2k}{k-2} \qquad P=\frac{1}{2-k}$$

a) $(x_1-x_2)^2=40$

$$\underbrace{x_1^2+x_2^2}-\underline{2x_1x_2}=40$$

$$(x_1+x_2)^2-4x_1x_2=40$$

$$\left(\frac{2k}{k-2}\right)^2-4\cdot\frac{1}{2-k}=40$$

$$\frac{4k^2}{(k-2)^2} + \frac{4}{k-2} = 40$$

$$\frac{k^2}{(k-2)^2} + \frac{1}{k-2} = 10$$

$$\frac{k^2+k-2}{(k-2)^2} = 10$$

$$k^2+k-2 = 10k^2-40k+40$$

$$9k^2-41k+42 = 0$$

$$\Delta = 1681-1512 = 169 = 13^2$$

$$k = \frac{41 \pm 13}{18}$$

b) $x_1 + x_2 < 0$

$$\frac{2k}{k-2} < 0$$

$N > 0 \quad k > 0$

$D > 0 \quad k > 2$

	0		2	
$- -$				
$- -$		$- -$		
$+$		$-$		$+$

$$\boxed{0 < k < 2}$$

$$k^2 + k - 2 > 0 \qquad (k+2)(k-1) > 0$$

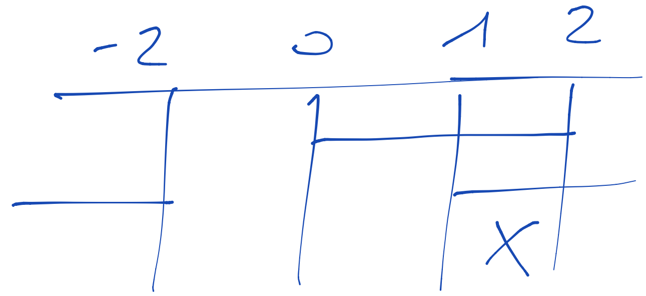
1° f. $k > -2$

2° f. $k > 1$

	-2		1	
$- -$				
$- -$		$- -$		
$+$		$-$		$+$

$$\boxed{k < -2 \lor k > 1}$$

$$\begin{cases} 0 < k < 2 \\ k < -2 \vee k > 1 \end{cases}$$



$$1 < k < 2$$