

$$A \times B - B^r = \{(1,2), (1,3), (2,2), (2,3), (3,3), (3,2)\} - \{(2,2), (2,3), (3,2), (3,3)\} = \{(1,2), (1,3)\}$$

۱

الف) $m^r = m+2 \rightarrow m^r - m - 2 = 0 \rightarrow (m-2)(m+1) = 0 \rightarrow m = -1, 2 \rightarrow \boxed{m = -1}$ قابل قبول

ب) $m^r = m+2 \rightarrow m^r - m - 2 = 0 \rightarrow (m-2)(m+1) = 0 \rightarrow m = -1, 2 \rightarrow \boxed{m = 2}$ قابل قبول

۲

$$\begin{aligned} x^r - 1 &= ax + b \xrightarrow{x=1} 1 - 1 = a + b \rightarrow a + b = 0 \\ ax + b &= x^r \xrightarrow{x=2} 2a + b = 1 \end{aligned} \rightarrow \begin{cases} a + b = 0 \\ 2a + b = 1 \end{cases}$$

۳

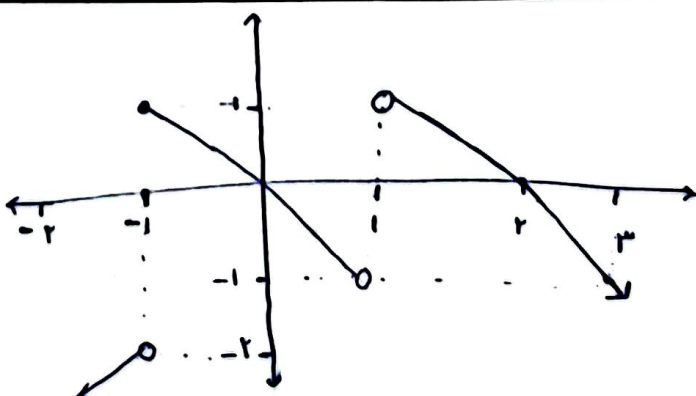
$$\begin{cases} -a - b = 0 \\ 2a + b = 1 \end{cases} \Rightarrow a \times b = -1 \times 1 = \boxed{-1}$$

$$2x - 3 = 4 - 3x \xrightarrow{x=k} 2k - 3 = 4 - 3k \rightarrow 5k = 7 \rightarrow \boxed{k = \frac{7}{5}}$$

۴

$$D_f = \mathbb{R} - \{1\}$$

$$R_f = [1, -\infty)$$



الف) $2y^2 + x^2 + 1 = 0 \rightarrow \begin{cases} 2y_1^2 = -x_1^2 - 1 \\ 2y_2^2 = -x_2^2 - 1 \end{cases} \xrightarrow{x_1=x_2} 2y_1^2 = 2y_2^2 \rightarrow y_1=y_2$
 تابع است ✓

ب) $(2y-2)^2 + (x-1)^2 = 0 \rightarrow$ (مجموع مربعات مثبت صفر)
 نقطه
 $y = \frac{2}{2}, x = 1$
 تابع است ✓

الف) $x \sin y = y \sin x \xrightarrow{x=0} 0 \times \sin y = y \times 0 \rightarrow y \rightarrow$ هر عددی می تواند باشد
 (بازای $x=0$) تابع نیست

ب) $1+1=2 \rightarrow x=y \rightarrow$ تمام عددی که در این معادله صدق کند جمع شود
 برابر ۲ است ← عدد ۱ است. تابع است ✓
 $\frac{x}{y} + \frac{y}{x} + 2 = 4 \rightarrow x^2 + y^2 = 2xy \rightarrow (x-y)^2 = 0 \rightarrow x=y$

الف) $y = \sqrt{\frac{x-1}{x-2}} + \sqrt{\frac{x-2}{x}}$
 $\begin{cases} \frac{x-1}{x-2} \geq 0 \xrightarrow{x=1} \frac{x}{x-2} \geq 0 \rightarrow (-\infty, 1] \cup (2, +\infty) \\ \frac{x-2}{x} \geq 0 \xrightarrow{x=2} \frac{x}{x-2} \geq 0 \rightarrow (0, 2] \cup [2, +\infty) \end{cases}$
 اشتراک: $D_f = [0, 1]$
 ب) $\begin{cases} x \geq 0 \\ y-1 \geq 0 \rightarrow y \geq 1 \end{cases} \Rightarrow D_f = \{(x, y) | x \geq 0, y \geq 1\}$

الف) $\begin{cases} x^2 - 7x + 4 \geq 0 \rightarrow (x-4)(x-1) = 0 \rightarrow x = 1, 4 \rightarrow D_f = (-\infty, 1] \cup (4, +\infty) \\ x^2 - 10x + 14 \geq 0 \rightarrow (x-2)(x-8) = 0 \rightarrow x = 2, 8 \rightarrow D_f = (-\infty, 2] \cup (8, +\infty) \end{cases}$
 اشتراک: $D_f = (-\infty, 1] \cup (8, +\infty)$

ب) $\frac{x^2 - 7x + 4}{x^2 - 10x + 14} \geq 0 \xrightarrow{a+b+c=0 \rightarrow x=1, \frac{c}{a}} \frac{x^2 - 7x + 4}{(x-2)(x-8)} \geq 0 \rightarrow D_f = (-\infty, 1] \cup (2, 4] \cup (8, +\infty)$

الف) $\begin{cases} 2x^2 - 5x + 3 \geq 0 \rightarrow x = \frac{5 \pm \sqrt{5}}{4} \rightarrow x = \frac{5 \pm \sqrt{25-20}}{4} = \frac{5 \pm \sqrt{5}}{4} \\ 2x^2 - 7x + 4 \geq 0 \rightarrow x = 1, \frac{4}{2} \rightarrow x = 1, 2 \end{cases}$
 $D_{f_1} \cap D_{f_2} = (-\infty, 1] \cup [\frac{5}{2}, +\infty)$

ب) $\frac{2x^2 - 5x + 3}{2x^2 - 7x + 4} \geq 0 \xrightarrow{x=1, \frac{3}{2}} \frac{x}{x(x-1)(x-2)} \geq 0 \rightarrow D_f = \mathbb{R} - (\frac{3}{2}, 2)$