

نام و نام خانوادگی پاسخنامه تشریحی تکلیف شماره کلاس		
الف) $\begin{cases} x + 2x - 1 = 3x - 1 & x \geq 2 \quad (1) \\ x - 2x + 1 \leq -x + 1 & x < 2 \quad (2) \end{cases}$	$R_f = 1 \cup 2 \Rightarrow [2, \infty) \cup (-2, \infty) =$ $R_f = [2, \infty) \checkmark$	(۲)
ب) $\begin{cases} x - 2 + x - 1 - x = x - 3 & x \geq 1 \quad (1) \\ -2x + 2 + x - 1 - x \leq -x + 1 & 1 > x \geq 1 \quad (2) \\ -x + 2 - x + 1 - x = -3x + 3 & 1 > x \geq 0 \quad (3) \\ -x + 2 > x + 1 + x \leq -x + 3 & x < 0 \quad (4) \end{cases}$	$R_f = 1 \cup 2 \cup 3 \cup 4$ $[-1, \infty) \cup (-1, 0] \cup (0, 1] \cup (1, \infty)$ $R_f = [-1, \infty) \checkmark$	۱
الف) $\begin{cases} 2x - 2 - x - 2 = 2x - 8 & x \geq 1 \\ -3x + 3 - x - 2 = -4x + 1 & 1 > x \geq -2 \\ -3x + 3 + x + 2 \leq -2x + 5 & x < -2 \end{cases}$	$R_f = 1 \checkmark$ $-3x - 2(-2) + 0 = 11$ $+2, 0 \rightarrow 2(2, 0) - 0 \leq 0$	(۲)
الف) $\begin{cases} x + \frac{x}{n} = x + 1 & x > 0 \\ x + \frac{x}{-n} = x - 1 & x < 0 \end{cases}$	$R_f = 1 \checkmark$	(۱,۷۵)
ب) $\begin{cases} x^2 - 1 & x > 0 \\ -x^2 + 1 & x < 0 \end{cases}$	$R_f = 1 \checkmark$	۳
الف) $\begin{cases} -2 - 2x - 1 \geq x - 1 & -1 - 2x > 0 \\ 1 - 2x & 2 > x \geq 1 \\ 2 - 2x & 2 > x \geq 1 \\ -1 > x \geq -2 \end{cases}$	$R_f = 1 \checkmark$	(۲)
ب) $\begin{cases} -2x u & -1 > x \geq -2 \\ -1 < x u & 0 > x \geq -1 \\ 1 < x u & 2 > x \geq 1 \end{cases}$	$R_f = 1 \checkmark$	۴
الف) $\begin{cases} 2x \in \mathbb{Z} & 2x - 2x = 0 \quad (1) \\ 2x \notin \mathbb{Z} & 2x - [2x] = (0, 1) \quad (2) \end{cases}$	$R_f = [0, 1) \checkmark$	(۱,۵)
۲. $\frac{x}{5} - [\frac{x}{5}] \in (0, 1) \checkmark$	$R_f = (0, 1) \checkmark$	۵

الف) $a=3, b=1 \quad R_f = [-\sqrt{a^2+b^2}, \sqrt{a^2+b^2}] \Rightarrow R_f = [-\sqrt{10}, \sqrt{10}] = [-\sqrt{10}, \sqrt{10}]$ ✓ ب) $a=4, b=-4 \quad R_f = [-\sqrt{16+16}, \sqrt{16+16}] = [-\sqrt{32}, \sqrt{32}] \Rightarrow R_f = [-\sqrt{32}, \sqrt{32}]$ ✓ ج) $a=2, b=0 \quad R_f = [-\sqrt{4+0}, \sqrt{4+0}] = [-2, 2] \Rightarrow R_f = [-2, 2]$ ✓ د) $\cos(x) - 2\sin(x) = -2\sin(x) + \cos(x) \quad a=-2, b=1 \quad R_f = [-\sqrt{4+1}, \sqrt{4+1}]$ ✓ $R_f = [-\sqrt{5}, \sqrt{5}] \Rightarrow R_f = [-\sqrt{5}, \sqrt{5}]$ ✓	✓ (2) ✓ ✓ ✓
الف) $\sin(x) = [-1, 1] \quad \frac{-b}{\sqrt{a^2+b^2}} = \frac{-1}{\sqrt{1+1}} \quad \frac{-1}{\sqrt{2}} \in [-1, 1]$ ب) $1 < 1+1 < 2 \quad -1 < 1-1 < 0 \quad R_f = [0, 2]$ ✓ ج) $\sin(x) = [-1, 1] \quad \frac{-b}{\sqrt{a^2+b^2}} = \frac{-1}{\sqrt{1+1}} \quad \frac{-1}{\sqrt{2}} \in [-1, 1]$ د) $1 < 1+1 < 2 \quad -1 < 1-1 < 0 \quad R_f = [\frac{1}{\sqrt{2}}, 2]$ ✓	(2) ✓ ✓ ✓
الف) $\sin^2 + \cos^2 = \sin^2 + \cos^2 + \cos^2 \Rightarrow 1 + \cos^2(x) \quad \cos^2 = [0, 1]$ (2) ب) $1 < 1+1 < 2 \Rightarrow [1, 2]$ ✓ ج) $1 + \cos^2 = \frac{\sin^2}{\sin^2} + \frac{\cos^2}{\sin^2} = \frac{\sin^2 + \cos^2}{\sin^2} = \frac{1}{\sin^2}$ $\frac{1}{\sin^2} = \frac{1}{\sin^2} \times \sin^2 = \cos^2 \sin^2 \Rightarrow \sin(2x) \Rightarrow \sin(4x) = [-1, 1]$ ✓	(2) ✓ ✓ ✓
الف) $(\sin^2 + \cos^2)(\sin^2 - \sin^2 \cos^2 + \cos^2) \Rightarrow 1 - \sin^2 \cos^2 - \sin^2 \cos^2 = 1 - 2\sin^2 \cos^2$ (1) $\sin(2x) = 2\sin \cos \Rightarrow \sin^2 \cos^2 = \sin^2(x) \quad \frac{1}{2} \sin^2(x) + \sin^2 \cos^2(x) \quad 1, 2 \Rightarrow 1 - \frac{1}{2} \sin^2(x)$ $\sin^2(x) = [0, 1] \Rightarrow 1 \geq 1 - \frac{1}{2} \sin^2(x) \geq \frac{1}{2} \Rightarrow R_f = [\frac{1}{2}, 1]$ ✓ ب) $(\sin^2 + \cos^2)^2 - 2\sin^2 \cos^2$ (2) (1) و (2) $\Rightarrow (1 - 2\sin^2 \cos^2)^2 - 2\sin^2 \cos^2 = 1 - 2\sin^2 \cos^2$ (3) $(1 - \frac{1}{2} \sin^2(x))^2 - \frac{1}{2} \sin^2(x) \Rightarrow 1 - \sin^2(x) + \frac{1}{4} \sin^4(x)$ $-\frac{b}{\sqrt{a^2+b^2}} = \frac{1}{2} \in [-1, 1] \Rightarrow 1 - 0 = 1 \quad 1 \Rightarrow 1 - 1 + \frac{1}{4} = \frac{1}{4} \quad R_f = [\frac{1}{4}, 1] \Rightarrow \{0, 1\}$ ✓	(2) ✓ ✓ ✓
الف) $\frac{(n-1)(n+1)}{n+1} \quad n \neq -1 \quad n-1 \Rightarrow 2(-1) - 1 = -3 \Rightarrow -3 \neq -1$ $R_f = \mathbb{R} - \{-1\}$ ✓ ب) $\frac{(n-1)(n^2+n+1)}{n-1} \quad n \neq 1 \quad n^2+n+1 \Rightarrow 1+1+1=3 \neq 1 \quad R_f = \mathbb{R} - \{1\}$ ج) $\frac{-b}{\sqrt{a^2+b^2}} = \frac{1}{2} \Rightarrow (-\frac{1}{2})^2 + -\frac{1}{2} + 1 = \frac{1}{4} - \frac{1}{2} + 1 = \frac{3}{4} \quad R_f = [\frac{3}{4}, 1]$	(1, 2) ✓ ✓ ✓