

$f(x) = \begin{cases} x^2 - 2 & x > a \\ 2(x-2) & x \leq a \end{cases}$
 $a^2 - 2 \geq 12a - 20$
 $a^2 - 12a + 18 \geq 0$
 $(a-3)^2(a+6) \geq 0$

$\rightarrow \frac{-2}{-1} + \frac{2}{1} = 0$
 $a = [-3, \infty)$

$y = 2x + k \Rightarrow 2y = 4x + 2k \Rightarrow 2y = 4x - k \Rightarrow y = \frac{4x - k}{2} = f^{-1}(x) = \frac{4x - k}{2}$
 $f^{-1}(2) = \frac{4(2) - k}{2} = 10$
 $f(x) = 2x - 10$

الن

$f(v) = 11$

بـ

$f(f(x)) =$

$2x - 2 - 10 = 2x - 12$

$y = \frac{a^2}{x-1} \rightarrow x = \frac{a^2}{y-1} \Rightarrow y(a-x) = -x$

$f^{-1}(2a) = \frac{-2a}{a-2a} = a \rightarrow$

$y = \frac{-x}{a-x} \rightarrow f^{-1}(x) = \frac{-x}{a-x}$

ا) $f \circ f^{-1} = \{ (0,2), (2,0), (1,1) \}$
 $\rightarrow \{ (0,0), (2,2), (1,1) \}$

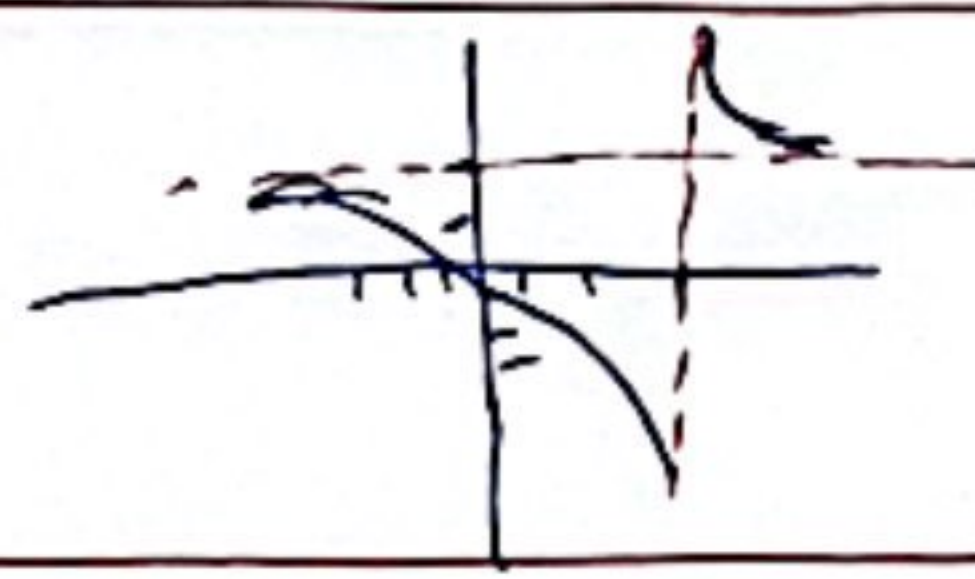
بـ $f^{-1} \circ f = \{ (2,2), (0,0), (1,1) \}$

جـ $f \circ g^{-1} = \{ (2,2), (1,1), (0,0) \}$
 $\rightarrow \{ (2,0), (0,2) \}$

دـ $g^{-1} \circ f = \{ (2,2), (1,1) \}$

$g^{-1} = \{ (1,2), (2,1), (0,0) \}$
 $f \circ g^{-1} = \{ (1,2), (2,1), (0,0) \}$
 $\frac{h}{f \circ g^{-1}} = \{ (1, \frac{1}{2}), (2, \frac{1}{2}) \}$

$y = \frac{2x+1}{x-2}$
 $\rightarrow yx - 2y = 2x + 1$
 $x = \frac{2y+1}{y-2} \rightarrow f^{-1}(y) = \frac{2y+1}{y-2}$



$f(x) = |x-1| - |x-2|$
 $[a,b] \supset [1,2]$
 $f(x) = 2x - f = y = 2x - f \Rightarrow 2y - f = x \Rightarrow 2y - x + f = 0 \Rightarrow f^{-1}(x) = \frac{x+f}{2}$
 $D_{f^{-1}}: [-2,2]$
 $R_{f^{-1}}: [1,2]$

سؤال 1-8

سؤال 9-10

$f(x) = \frac{x}{x+1}$
 $x = \frac{y}{y+1} \rightarrow xy^2 + x - y = 0 \rightarrow y = \frac{1 \pm \sqrt{1-4x^2}}{2x}$
 $R_{f(x)} = [-\frac{1}{2}, \frac{1}{2}]$
 $D_{f^{-1}(x)} = [-\frac{1}{2}, \frac{1}{2}]$
 $f^{-1}(x) = \frac{1 \pm \sqrt{1-4x^2}}{2x}$
 $D_{f^{-1}(x)} = [-\frac{1}{2}, \frac{1}{2}]$