

الف) $(3, 2) = (m, 2) \Rightarrow m = 3$ $n^2 - n = 2 \Rightarrow n^2 - n - 2 = 0 \Rightarrow (n-2)(n+1) = 0 \Rightarrow \begin{cases} n = -1 \\ n = 2 \end{cases}$
 $\rightarrow n = -1 \Rightarrow (-1, 2) (-1, 2)$ $\Rightarrow$ زوج نیست $\boxed{n = 2}$

ب) $(2, 2) = (m, 2) \Rightarrow m = 2 \rightarrow (a, m-1) = (a, 1) \quad (-1, 1) \neq (a, 1) \Rightarrow a = -1$

$(a+2, n) = (1, n) \Rightarrow \boxed{n = 2}$

$f(x) = \begin{cases} 3x-1 & x > 1 \\ x+a & x < 1 \end{cases} \xrightarrow{\mathbb{R}} \begin{cases} 3x > 3 \Rightarrow 3x-1 > 2 \\ x+a < 1+a \end{cases} \Rightarrow 1+a < 2 \Rightarrow \boxed{a < 1}$

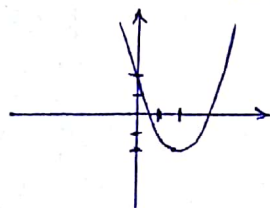
$f(x) = \begin{cases} 3x-1 & x > 1 \\ ax+a-1 & x < 0 \end{cases} \rightarrow \begin{cases} 3x > 3 \Rightarrow 3x-1 > 2 \\ ax < 0 \Rightarrow ax+a-1 < a-1 \end{cases} \rightarrow \begin{cases} a-1 < 2 \\ a < 1 \end{cases} \quad \text{I}$
 $\rightarrow a < 0$ II $\text{I} \cap \text{II} \Rightarrow \boxed{0 < a < 1}$

الف) $y = x^3 + 2 \rightarrow y = x_1^3 + 2$
 $y = x_2^3 + 2 \rightarrow x_1^3 + 2 = x_2^3 + 2 \Rightarrow x_1 = x_2$ $\Rightarrow$ یک به یک است
 $f^{-1}(n) = x = y^3 + 2 \Rightarrow y = \sqrt[3]{x-2}$

ب) $y = x^2 - 4x + 2$

$x_5 = \frac{-b}{2a} = 2$

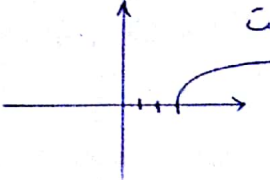
$y_5 = 2^2 - 4(2) + 2 = -2$



$\Rightarrow$ یک به یک نیست

الف) $y = \frac{2x+1}{x-2} \rightarrow$ $\Rightarrow$ یک به یک نیست $y(x-2) = 2x+1 \Rightarrow x(y-2) = 2y+1 \Rightarrow x = \frac{2y+1}{y-2}$
 $f^{-1}(n) \Rightarrow y = \frac{2x+1}{x-2}$

ب) $y = \frac{4+2x}{x+2} \rightarrow y = \frac{2(2+x)}{x+2} \Rightarrow y = 2$ $\Rightarrow$ یک به یک نیست

و) $y = \sqrt{x-2}$  مشتق باست $x = \sqrt{y-2} \Rightarrow x^2 = y-2 \Rightarrow x^2 + 2 = y$ $f^{-1}(x) = x^2 + 2, x \geq 0$	6
ب) $y = x^2 - 2x + 2, x \in [2, +\infty)$ $y = x^2 - 2x + 2 + 1 - 1 \Rightarrow y = (x-1)^2 - 1 \Rightarrow y = (x_1 - 1)^2 - 1$ $(x_1 - 1)^2 = y + 1 \Rightarrow x_1 - 1 = \pm \sqrt{y+1} \Rightarrow x = 1 \pm \sqrt{y+1}$ مشتق باست $f^{-1}(x) = 1 + \sqrt{x+1}$ $x \geq -1$ مشتق باست $D = [2, +\infty)$	7
$f(x) = x + \sqrt{x} - (1, +\infty)$ $f^{-1}(x) \Rightarrow y = x + \sqrt{y} \Rightarrow x = y - \sqrt{y} \Rightarrow x = t^2 - t \Rightarrow x = 0 \Rightarrow \frac{-1 \pm \sqrt{1+4x}}{2} (1, +\infty)$ $\frac{-1 + \sqrt{1+4x}}{2} \Rightarrow \left(\frac{-1 + \sqrt{1+4x}}{2}\right)^2 = \frac{1 + 1 + 4x - 2\sqrt{1+4x}}{4} = \frac{x}{1} + \frac{1}{2} - \frac{\sqrt{1+4x}}{2}$ $x + \frac{1}{2} - \sqrt{x + \frac{1}{2}} \Rightarrow a=1, b=\frac{1}{2}, c=-\frac{1}{2}$ $a+2b+c = 1 + 2(\frac{1}{2}) + (-\frac{1}{2}) = 1 + 1 - \frac{1}{2} = 1\frac{1}{2}$	8
$y = \frac{x}{\sqrt{x^2-2}} - \frac{x_1}{\sqrt{x_1^2-2}} = \frac{x_2}{\sqrt{x_2^2-2}} \Rightarrow \frac{x_1^2}{x_1^2-2} = \frac{x_2^2}{x_2^2-2} \Rightarrow x_1^2 x_2^2 - 2x_2^2 = x_1^2 x_2^2 - 2x_1^2$ $x_1^2 = x_2^2 \Rightarrow x_1 = \pm x_2$ مشتق باست $x = \frac{y}{\sqrt{y^2-2}} \Rightarrow x^2 = \frac{y^2}{y^2-2} \Rightarrow x^2 y^2 - 2x^2 = y^2 \Rightarrow y^2(x^2-1) = 2x^2 \Rightarrow y = \frac{x\sqrt{2}}{\sqrt{x^2-1}}$	9
$g(x) = \sqrt{x-1} = -\frac{r}{a} \Rightarrow \sqrt{x} = \frac{r}{a} - x = \frac{a}{r_0} \Rightarrow g(\frac{a}{r_0}) = -\frac{r}{a} \Rightarrow g^{-1}(-\frac{r}{a}) = \frac{a}{r_0}$ $\frac{x}{1+x^2} = -\frac{r}{a} \Rightarrow +r + r x = -ax \Rightarrow \frac{xr}{1-rx} = -ax \Rightarrow rx = -r \Rightarrow x = -\frac{r}{r} \Rightarrow f(-\frac{r}{r}) = -\frac{r}{r}$ $f^{-1}(-\frac{r}{a}) = \frac{r}{r}$ $f(-\frac{r}{a}) + g^{-1}(-\frac{r}{a}) = -\frac{r}{r} + \frac{a}{r_0} = \frac{-a + r_0}{r_0} = \frac{-r_0}{r_0} = -1$	10