

الف) $n^2 - n = 2 \rightarrow n = 1 \rightarrow X \rightarrow \Delta \neq \Gamma$

$2 = 2 \Rightarrow m = 3$

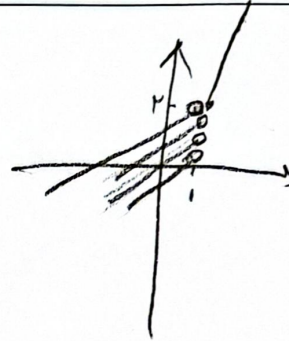
(۲)

ب) $n = 2 \rightarrow m = 2$

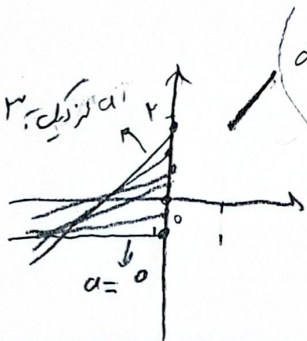
$(a, 1) \rightarrow a = -1 \rightarrow n = 1$

$a + 1 \leq n - 1 \rightarrow a \leq 1$

$(-\infty, 1]$



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$a - 1 \leq n - 1 \rightarrow a \leq n$
 $a > 0$

$0 < a \leq n$
 $(0, n]$

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الف) $y = a^x + 2$

$x = y + 2 \rightarrow y = \sqrt{x - 2}$

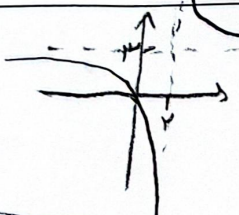
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ب) $y = x^2 - 4x + 2$

$\frac{b}{4a} = 2 \rightarrow x = 2 \rightarrow y = -1$
 $x = 1 \rightarrow y = -1$

الف) $f(x): y = \frac{rx + 1}{x - 2}$



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

ب) $f(x): y = \frac{rx + r}{x + r} \rightarrow y = 2$
 $(x \neq -r)$

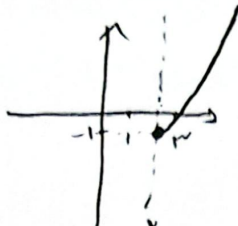


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a) $f(x): y = \sqrt{x-r} \rightarrow$  $\checkmark \rightarrow f^{-1}(x): x = \sqrt{y-r} \rightarrow y = x^2 + r$
 $(x \geq 0)$

b) $f(x): y = x^2 - rx + r$  $\checkmark$
 $f^{-1}(x): x = y^2 - ry + r$
 $y = \frac{r \pm \sqrt{r^2 - 4r(x-r)}}{2} \Rightarrow y = r \pm \sqrt{x-r}$

$f(x): y = x + \sqrt{x} \quad f^{-1}(x): x = y + \sqrt{y} \rightarrow (x-y)^2 = y \rightarrow x^2 - 2xy + y^2 - y = 0$

$y^2 - (2x+1)y + x^2 = 0 \rightarrow y = \frac{2x+1 \pm \sqrt{(2x+1)^2 - 4x^2}}{2}$

$y = \frac{2x+1 \pm \sqrt{4x^2 + 4x + 1 - 4x^2}}{2} = \frac{2x+1 \pm \sqrt{4x+1}}{2}$
 $\checkmark \rightarrow y = \frac{2x+1}{2} \pm \sqrt{x + \frac{1}{4}} \rightarrow c = -\frac{1}{4}$
 $\forall x \geq 0, y \geq 0$

$f(x): y = \frac{x}{\sqrt{x^2-r}}$

$\begin{cases} (x_1, y_1) \in f(x) \\ (x_2, y_2) \in f(x) \end{cases} \Rightarrow \begin{cases} y_1 = \frac{x_1}{\sqrt{x_1^2-r}} \\ y_2 = \frac{x_2}{\sqrt{x_2^2-r}} \end{cases}$

$\Rightarrow \frac{x_1^2}{x_1^2-r} = \frac{x_2^2}{x_2^2-r}$

$x_1^2 x_2^2 - r x_1^2 = x_1^2 x_2^2 - r x_2^2$

$f^{-1}(x): x = \frac{y}{\sqrt{y^2-r}} \rightarrow x^2 = \frac{y^2}{y^2-r} \rightarrow y^2 = \frac{x^2 r}{x^2-1} \rightarrow y = \pm \frac{x\sqrt{r}}{\sqrt{x^2-1}}$

$f(-\frac{r}{a}) = x \rightarrow f^{-1}(x) = -\frac{r}{a} \rightarrow \frac{x}{1+\frac{x^2}{a^2}} = -\frac{r}{a} \rightarrow x a - r = a x^2$
 $\checkmark \rightarrow x = \frac{-r}{a}$

$g^{-1}(-\frac{r}{a}) = x \rightarrow g(x) = -\frac{r}{a} \rightarrow \sqrt{x^2-1} = -\frac{r}{a} \rightarrow \sqrt{x^2-1} = \frac{r}{a} \rightarrow x = \frac{a}{r}$

$f(-\frac{r}{a}) + g^{-1}(-\frac{r}{a}) = \frac{a}{r} - \frac{r}{a} = -\frac{r^2}{a^2}$

$g^{-1}(1r) = x \rightarrow g(x) = 1r$

$f(x) + \sqrt{f(x)} = 1r \rightarrow (1r-t)^2 = t \rightarrow 1r^2 - 2rt + t^2 = t$
 $\rightarrow t = \frac{1r^2 \pm \sqrt{1r^4 - 4r^2}}{2}$

$f(m) = 9 \rightarrow f^{-1}(9) = m \rightarrow \sqrt{m} = 3$