

1A, 1.75

سید علی خندان

1.75

$$a) y = n^2 - 2n^2 + 2n \Rightarrow y - 1 = n^2 - 2n^2 + 2n - 1 \Rightarrow y - 1 = (n-1)^2 \Rightarrow \sqrt{y-1} = n-1 \\ \Rightarrow n = \sqrt{y-1} + 1 \rightarrow R = \mathbb{R}$$

$$b) y = \frac{1}{n^2 - 2n} \Rightarrow 1 = y(n^2 - 2n) \Rightarrow 1 = y(n^2 - 2n) \Rightarrow \frac{1}{y} = n^2 - 2n$$

$$\frac{1}{y} + 1 = n^2 - 2n + 1 \Rightarrow (n-1)^2 = \frac{1}{y} + 1 \Rightarrow \sqrt{\frac{1}{y} + 1} = n-1 \Rightarrow \\ n = \sqrt{\frac{1}{y} + 1} + 1 \Rightarrow \frac{1}{y} + 1 \geq 0 \Rightarrow \frac{y+1}{y} \geq 0$$

$$R_y = \left\{ \frac{1}{y} + 1 \geq 0 \right\} = \left\{ y \in (-\infty, -1] \cup (0, +\infty) \right\}$$

$$a) y = n^2 - 4n + 1 \Rightarrow \text{ext} \left\{ \frac{b}{2a} = 2 \right\} \Rightarrow R_y = [1, +\infty) \quad \text{②} - 2$$

$$b) y = -n^2 + 4n + 3 \Rightarrow \text{ext} \left\{ \frac{b}{2a} = 2 \right\} \Rightarrow R_y = (-\infty, 7] \quad \text{②} - 2$$

$$c) y = \sqrt{n^2 - 4n - 3} \Rightarrow \text{ext} \left\{ \frac{b}{2a} = 2 \right\} \Rightarrow R(\sqrt{n^2 - 4n - 3}) = [1, +\infty)$$

$$d) y = \sqrt{-n^2 + 4n} \Rightarrow \text{ext} \left\{ \frac{b}{2a} = 2 \right\} \Rightarrow R(\sqrt{-n^2 + 4n}) = [0, 2] \quad \text{②} - 2$$

$$a) y = n^2 - 5n^2 + 2n + 1 \Rightarrow R_y = \mathbb{R} \quad \text{②} - 2$$

$$b) y = n^2 - 4n^2 + 2n + 2 \Rightarrow R_y = \mathbb{R} \quad \text{②} - 2$$

$$c) y = \sqrt{n^2 - 4n^2 + 2n + 1} \Rightarrow R(\sqrt{n^2 - 4n^2 + 2n + 1}) = \mathbb{R}$$

$$d) y = (n^2 - 4n^2 + 2n + 1)^2 \Rightarrow R((n^2 - 4n^2 + 2n + 1)^2) = [0, +\infty) \quad \text{②} - 2$$

سویچ‌های

(۲) - ۲

الف) $g = \frac{2n+1}{n-2} \xrightarrow{ad \neq bc} Rg = \mathbb{R} - \{2\} \checkmark$ $IR - \frac{a}{c}$

ب) $g = \frac{2n+1}{n+1} \xrightarrow{ad \neq bc} Rg = \mathbb{R} - \frac{a}{c} = \mathbb{R} - \{2\} \checkmark$

الف) $g = \sqrt{\frac{2n+1}{n+1}}$ $\rightarrow ad \neq bc = \dots \xrightarrow{\dots} Rg = [0, +\infty) \checkmark$ (۲) - ۵

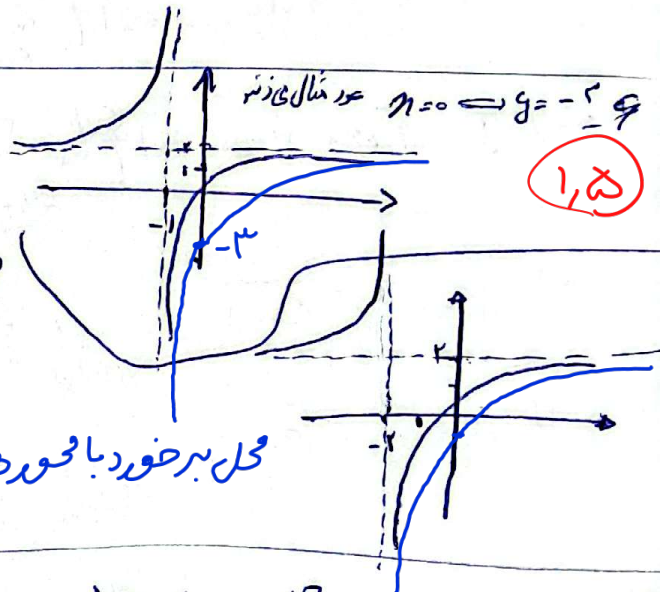
ب) $g = \sqrt{\frac{2n+1}{n+1}}$ $\xrightarrow{ad \neq bc} Rg = [0, +\infty) \checkmark$

الف) $g = \frac{2n-2}{n+1}$ (۱) - ریشه یخ = جواب نام
(۲) - جواب = $\frac{a}{c} = 2 \checkmark$

ب) $g = \frac{2n-1}{n+2}$ (۲) - ریشه یخ = جواب نام
(۳) - جواب = $\frac{a}{c} = 2 \checkmark$

عشاق $n \rightarrow \infty \Rightarrow g = -\frac{1}{2}$

حل بر خود با خود ها غیر نمی



(۲) - ۷

الف) $g = \frac{\sin n}{\sin n} + \frac{1}{\sin n} = a + \frac{1}{a} = g \Rightarrow Rg = [2, +\infty) \cup (-\infty, -2] \checkmark$

ب) $g = \frac{a^n}{a^n} + \frac{1}{a^n} = a + \frac{1}{a} = g \Rightarrow Rg = [2, +\infty) \cup (-\infty, -2] \checkmark$

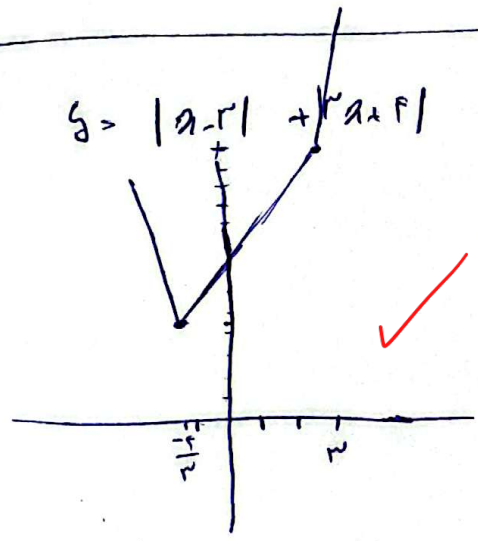
ج) $g = \frac{\sqrt{n}}{\sqrt{n}} + \frac{1}{\sqrt{n}} = a + \frac{1}{a} = g \Rightarrow Rg = [2, +\infty) \cup (-\infty, -2] \checkmark$

د) $g = \frac{a}{\sqrt{n}} + \frac{1}{\sqrt{n}} = a + \frac{1}{a} = g \Rightarrow Rg = [2, +\infty) \checkmark$

د) $g = a^r + \frac{1}{a^{r+r}} \Rightarrow g = \left(a^r + r + \frac{1}{a^{r+r}} \right) - r$

$g_1 = a^r + r + \frac{1}{a^{r+r}} \xrightarrow{a > 1} a^{r+r} \geq r$ $Ag_1 = \left[r + \frac{1}{r} + \infty \right) = \left[\frac{1}{r} + \infty \right) \Rightarrow Ag = \left[\frac{1}{r} + \infty \right) \checkmark$

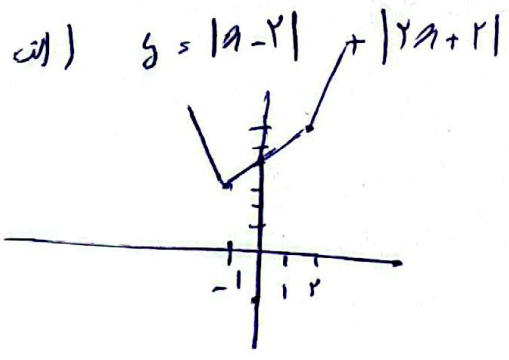
د) $g = \frac{a^r + a}{\sqrt{a^{r+r}}} = \sqrt{a^r + r} + \frac{1}{\sqrt{a^{r+r}}} \xrightarrow{a > 1} \sqrt{a^{r+r}} \geq r$ $Ag = \left[r + \frac{1}{r} + \infty \right) = \left[\frac{a}{r} + \infty \right) \checkmark$



Sign chart for $g = |a-r| + |ra+r|$:

Interval	Sign of $ a-r $	Sign of $ ra+r $	Result
$r < -\frac{1}{a}$	-	-	$-a-r-ra-r = -2a-1$
$-\frac{1}{a} < r < 1$	-	+	$-a-r-ra+r = -2a$
$r > 1$	+	+	$a-r-ra+r = a-1$

Roots: $-\frac{1}{a}, 1$. $Ag = \left[\frac{1}{r} + \infty \right) \Rightarrow Ag = \mathbb{R}$

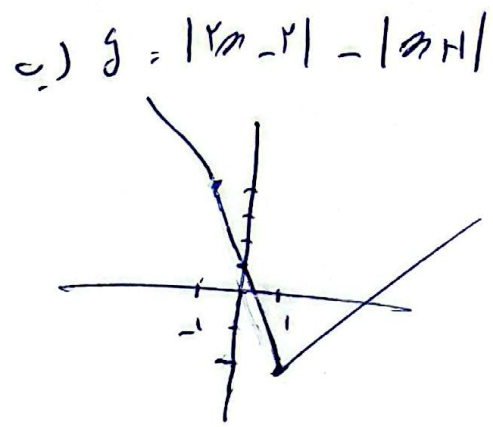


Sign chart for $g = |a-r| + |ra+r|$:

Interval	Sign of $ a-r $	Sign of $ ra+r $	Result
$r < -1$	-	-	$-a-r-ra-r = -2a-1$
$-1 < r < a$	-	+	$-a-r-ra+r = -2a$
$r > a$	+	+	$a-r-ra+r = a-1$

Roots: $-1, a$. $Ag = \left[a + \infty \right)$

$R = [a, +\infty)$ $\therefore \text{لا يوجد}$



Sign chart for $g = |ra-r| - |a-r|$:

Interval	Sign of $ ra-r $	Sign of $ a-r $	Result
$r < -1$	-	-	$-ra+r-a+r = -2a+1$
$-1 < r < 1$	+	-	$ra-r-a+r = -a+1$
$r > 1$	+	+	$ra-r-a-r = -a-1$

Roots: $-1, 1$. $Ag = \left[-1, +\infty \right)$

$R = [-1, +\infty)$