

الف) $f(n) = \sqrt{n|n|}$

$g(n) = n$

$n|n| > n \rightarrow$ مثلاً $n=2 \rightarrow 2 < 4$ $\rightarrow$ برابری نیست

$D_f = \mathbb{R}^+$
 $D_g = \mathbb{R}$

برابری نیست

ب) $f(n) = n^2 + 4n + 2 + n + 2 \rightarrow \frac{n^2 + 5n + 4}{n^2 + 5n + 4} = 1$
 $g(n) = 1$

$D_f = \mathbb{R}$
 $D_g = \mathbb{R}$

برابری هست

ج) $f(x) = \frac{r \sin x - r}{r \sin x - r} \rightarrow \frac{r \sin x (r \sin x - r)}{r \sin x - r} = r \sin x$

برابری هست

$g(x) = r \sin x$

$r \sin x - r \neq 0 \rightarrow \sin x \neq \frac{r}{r}$

د) $f(n) = \frac{n}{|n|}$, $g(n) = \frac{|n|}{n}$

$D_f = \mathbb{R} - \{0\}$

$D_g = \mathbb{R} - \{0\}$

برابری نیست

الف) $f(n) = \left[\frac{n^2}{n^2+1} \right] \rightarrow f(n) = \left[\frac{n^2+1-1}{n^2+1} \right] = \left[1 - \frac{1}{n^2+1} \right] = [1^-] = 0$

$g(n) = [n - [n]] = 0$ $D_f = \mathbb{R}$ $D_g = \mathbb{R}$ $g(n) = f(n)$

برابری هست

ب) $D_f = D_g$ $f(n) \neq g(n)$ مثلاً $n = -2, 2 \rightarrow f(n) = -\frac{1}{n} \neq g(n) = \frac{1}{n}$

برابری نیست

ج) $f(n) = n - |n| > 0$ $g(n) = |n| - n > 0$

$n > |n|$

$|n| > n$

$D_g \neq D_f$

$D_f = \emptyset$

$D_g = \mathbb{R}^+$

برابری نیست

د) $f(n) = \frac{n^2 - n}{n - 1} \xrightarrow{n \neq 1} \frac{n(n-1)}{n-1} = n$

$f(n) = g(n) \rightarrow D_f = D_g$

برابری هست

$f(n) - g(n) = n^2 - n + 1 \rightarrow g(n) = n$

$f(n) + g(n) = n^2 + n + 1$

$2f(n) = 2n^2 + 2 \rightarrow f(n) = n^2 + 1$

$f'(n) - g'(n) = (n^2 + 1)' - n' = 2n + 1 + 2n^2 - n^2 = n^2 + n + 1$

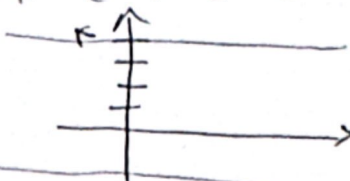
$$f(n) = n - \sqrt{n^2 - \varepsilon}$$

$$g(n) = n + \sqrt{n^2 - \varepsilon}$$

(سوال ۴)

$$n^2 - \varepsilon \geq 0$$

$$n^2 \geq \varepsilon \rightarrow n \geq \sqrt{\varepsilon} \rightarrow P_f = (-\infty, -\sqrt{\varepsilon}] \cup [\sqrt{\varepsilon}, +\infty)$$



$$f(n)g(n) = (n - \sqrt{n^2 - \varepsilon})(n + \sqrt{n^2 - \varepsilon})$$

$$\begin{cases} n \geq \sqrt{\varepsilon} \rightarrow \varepsilon \\ n \leq -\sqrt{\varepsilon} \rightarrow \varepsilon \end{cases}$$

$$g(n) = \frac{n-b}{n^2 - \varepsilon}$$

$$: C, \quad n^2 - \varepsilon n - a$$

$$(n - \varepsilon)(n + \varepsilon) \rightarrow n = \frac{\varepsilon}{2}, a = -1$$

$$f(n) = \frac{an + r}{n^2 - mn + n}$$

(سوال ۵)

$$\begin{aligned} n - b &= an + r \rightarrow -b = r \Rightarrow b = -r \\ an &= n \Rightarrow a = 1 \end{aligned}$$

$$-m = \frac{r}{r} \rightarrow m = -\frac{r}{r}$$

$$n = \frac{\varepsilon}{r} \times -1 = -\frac{\varepsilon}{r}$$

$$\frac{an - b}{n} + a \geq \frac{\sqrt{\varepsilon}}{r}$$

(سوال ۶)

$$f = \{(-1, 2), (2, \varepsilon), (3, -2), (0, \frac{1}{r})\}$$

$$g = \{(2, \varepsilon), (3, \varepsilon), (-1, -\varepsilon), (0, 0)\}$$

(سوال ۷)

$$\frac{fg}{f+g} = \frac{(2, \varepsilon)(2, \varepsilon)(-1, -\varepsilon)(0, 0)}{(2, \varepsilon)(3, \varepsilon)(-1, -\varepsilon)}$$

$$\Rightarrow \{(2, 1), (-1, 4), (3, 3)\}$$

$$R = \{\varepsilon, 1, 3\}$$

$$a = -1$$

$$3a - 2b = 1 \rightarrow -3 - 2b = 1$$

$$-2b = 4 \rightarrow b = -2$$

(سوال ۸)

$$(a, b) \rightarrow (-1, -2)$$

$$c = \frac{a - 3b}{-1 + 4} \Rightarrow c = \frac{-1 - 3(-2)}{3} = \frac{5}{3}$$

$$d - 1 = f$$

$$d = -1$$

$$f(n) = \sqrt{-n^2 + an - m} \Rightarrow \sqrt{-(n^2 - an + m)}$$

(سوال ۹)

$$\Delta = 0$$

$$\Delta = 1 - 4fm$$

$$m = \frac{1}{\varepsilon}$$

$$g(n) = \{(a, b)\}$$

$$\sqrt{(n^2 - n + \frac{1}{\varepsilon})} \rightarrow -(n - \frac{1}{r})^2 \rightarrow n = \frac{1}{r}$$

$$b = 0$$

$$\frac{a+b}{r} = \frac{1}{r} \Rightarrow a+b=1$$

$$2) \frac{r(a + \frac{a}{r})}{(n + \frac{a}{r})(n - c) \rightarrow n^2 + (\frac{a}{r} - c)n - \frac{ac}{r}}$$

$$\frac{a}{r} - c = \varepsilon \rightarrow c = \frac{a}{r} - \varepsilon$$

$$b = -\frac{ac}{r}$$

(سوال ۱۰)

$$a + b + c \geq a - \frac{a(a - \varepsilon)}{r} + \frac{a}{r} - \varepsilon \Rightarrow a - \frac{a^2}{r} + \frac{a}{r} + \frac{a}{r} - \varepsilon$$