

$n/n \geq 0$
 $n \geq 0$

الف) $f(n) = \sqrt{n|n|}$, $g(n) = n$
 $D_f = [0, +\infty) \rightarrow D_f \neq D_g$
 $D_g = \mathbb{R} \rightarrow D_f \neq D_g$

ب) $f(n) = \frac{(n+1)(n+1) + n+1}{n^2 + 2n + 1}$, $g(n) = 1$
 $D_f = \frac{n^2 + 2n + 1}{n^2 + 2n + 1} = \{1\}$
 $D_g = \{1\} \rightarrow D_f = D_g$
 $f(n) = g(n)$

ج) $f(n) = \frac{r \sin^2 n - r \sin n}{r \sin n - r}$, $g(n) = r \sin n$
 $D_f = \frac{r \sin n (r \sin n - r)}{r \sin n - r} = r \sin n$
 $D_g = r \sin n \rightarrow D_f = D_g$
 $f(n) = g(n)$

د) $f(n) = \frac{n}{|n|}$, $g(n) = \frac{|n|}{n}$
 $D_f = \mathbb{R} - \{0\}$
 $D_g = \mathbb{R} - \{0\} \rightarrow D_f = D_g$
 $f(n) \neq g(n)$

الف) $f(n) = \left\lfloor \frac{n}{n^2+1} \right\rfloor$, $g(n) = [n - \frac{1}{n}]$
 $D_f = \mathbb{R}$
 $D_g = \mathbb{R} - \{0\}$
 $D_f \neq D_g$
 $f(n) \neq g(n)$

ب) $f(n) = \frac{1}{[n]}$, $g(n) = \frac{1}{r[n]}$
 $D_f = 0 \leq r n < 1 \Rightarrow 0 \leq n < \frac{1}{r}$
 $D_g = 0 \leq n < 1$
 $D_f \neq D_g$
 $f(n) \neq g(n)$

ج) $f(n) = \frac{1}{\sqrt{n-|n|}}$, $g(n) = \frac{1}{\sqrt{|n|-n}}$
 $D_f = \{n > 0 \rightarrow \text{OK}, n=0 \rightarrow \text{OK}, n < 0 \rightarrow \text{X}\}$
 $D_g = \{n > 0 \rightarrow \text{X}, n=0 \rightarrow \text{OK}, n < 0 \rightarrow \text{OK}\}$
 $D_f \neq D_g$
 $f(n) \neq g(n)$

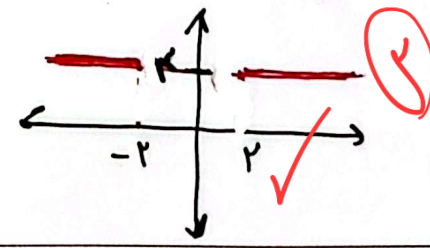
د) $f(n) = \begin{cases} \frac{n^r - n}{n-1}, & n \neq 1 \\ r, & n = 1 \end{cases}$, $g(n) = n^r + n$
 $f(n) = r$
 $g(n) = n^r + n$
 $f(n) \neq g(n)$

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

$f(n) - g(n) = (n^r + 1) - n = n^r + 1 - n = n^r + n^r + 1$

$f \times g = (n - \sqrt{n^r - r})(n + \sqrt{n^r - r}) \Rightarrow n^r - n^r + r = r$

$D_f = D_g \rightarrow n^r - r \geq 0 \rightarrow n^r \geq r$
 $n \geq r$
 $n \leq -r$



$g(n) = \frac{n-b}{r n^r - r n - a}$
 $r a n = n \rightarrow r a = 1 \rightarrow a = \frac{1}{r}$

$(g=f) \rightarrow -r m n = -r n \rightarrow -r m = -r \rightarrow m = \frac{r}{r}$
 $-b = r \rightarrow b = -r$
 $r n = -a \rightarrow n = -\frac{a}{r}$

$f(n) = \frac{r a n + r}{r n^r - r m n + n} = \frac{r a n + r}{r n^r - r m n + n}$
 $a m - b n = \frac{1}{r} \times \frac{r}{r} - (-r \times -\frac{1}{r}) = -9.15$

$$g(m) = c$$

$$f(m) = \frac{bm+r}{\lambda m+b}$$

$$b=N \rightarrow \frac{rN+r}{\lambda N+r} = \frac{1}{r} \rightarrow \frac{ab}{c} = \frac{-\frac{1}{r} \times N}{\frac{1}{r}} = -N$$

$$b=-N \rightarrow \frac{-rN+r}{\lambda N-N} = -\frac{1}{r} \rightarrow \frac{ab}{c} = \frac{\frac{1}{r} \times N}{-\frac{1}{r}} = -N$$

$$c = \pm \frac{1}{r}$$

$$\frac{ab}{c} = \pm N$$

$$g(m) = f(m) \rightarrow c = \frac{bm+r}{\lambda m+b} \rightarrow bN+r = \lambda cN + cb \rightarrow cb = r$$

$$b = \lambda c \rightarrow c = \frac{b}{\lambda} \rightarrow bc = \left(\frac{b}{\lambda}\right)b = \frac{b^2}{\lambda} = r \rightarrow b^2 = \lambda r$$

$$\begin{cases} b=N \\ b=-N \end{cases}$$

$$f-1 = \{(-1, 3), (1, 4), (3, -1), (0, 0)\} \rightarrow f = \{(-1, 4), (1, 5), (3, -1), (0, 1)\}$$

$$g = \{(1, 4), (3, 4), (-1, -1), (0, 0)\}$$

$$\frac{fg}{f+g} = \frac{\{(-1, -1), (1, 1), (3, 4), (0, 0)\}}{\{(-1, -2), (1, 1), (3, 5)\}} = \{(-1, \frac{1}{3}), (1, \frac{1}{4}), (3, \frac{1}{5})\}$$

$$R_{\frac{fg}{f+g}} = \{1, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}\}$$

$$f = \{(1, a), (-3, 2a-2b), (c, d), (1, d)\} \rightarrow a = d = -1$$

$$g = \{(1, -1), (-3, 1), (a-2b, d)\} \quad 2a-2b = 1 \rightarrow -3-2b = 1$$

$$f=g$$

$$\begin{aligned} a-2b &= c \\ c &= -1+2 = 1 \end{aligned}$$

$$\begin{aligned} -2b &= 4 \\ b &= -2 \end{aligned}$$

$$d+c = -1+1 = 0$$

$$f(m) = \sqrt{-n^2+n-m} \rightarrow -(n^2-n+m) \geq 0 \xrightarrow{\text{discriminant}} -n^2+n-\frac{1}{4} \geq 0$$

$$b = \sqrt{-\frac{1}{4} + \frac{1}{4} - \frac{1}{4}} = \sqrt{0} = 0$$

$$a+b = \frac{1}{r} + 0 = \frac{1}{r}$$

$$n^2-n+\frac{1}{4} \leq 0$$

$$(n-\frac{1}{2})^2 \leq 0 \rightarrow n = \frac{1}{2} \rightarrow a = \frac{1}{\frac{1}{2}} = 2$$

$$f(m) = \frac{rm+a}{n^2+4n+b} = g(m) = \frac{r}{n-c} \rightarrow f(m) = \frac{rm+a}{(n+\frac{a}{r})(n-c)} \rightarrow Df = \mathbb{R} - \{c, -\frac{a}{r}\}$$

$$Df = Dg \rightarrow Dg = \mathbb{R} - \{c\} \rightarrow c = -\frac{a}{r} \rightarrow (rm+a)(n-c) = rm^2+rm+bm$$

$$\rightarrow rm^2+(a-rc)m-ac = rm^2+rm+bm \rightarrow a-rc = 1r$$

$$-ac = rb \rightarrow b = \frac{-ac}{r} = \frac{-rc^2-1rc}{r} \rightarrow a = 1r+rc$$

$$\rightarrow -rc = 1r \rightarrow c = -1$$

$$b = c^2-4c \quad a = -rc = rc+1r$$

$$\begin{aligned} a+b+c &= (rc+1r) + (-c^2+4c) + c \\ &= 4+9-1 = 12 \end{aligned}$$