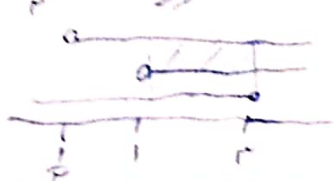


الف	$\frac{n+3}{(n+2)(n-1)(2n-1)}$	$D_R = \mathbb{R} - \{-2, 1, \frac{1}{2}\}$	1
ب	$\frac{n+3}{(n+2)(n+1)(2n+1)}$	$D_R = \mathbb{R} - \{-2, -1, -\frac{1}{2}\}$	1
الف	$\frac{n+3}{(n-1)(n^2-n+1)}$	$\Delta = b^2 - 4ac \quad 1-2 = -2 \times$ $D_R = \mathbb{R} - [1]$	2
ب	$\sqrt{\frac{n+3}{(n-1)(n^2-n+1)}}$	$-\frac{2}{3} - \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$ $D_R = \mathbb{R} - (-2, 1]$	2
I	$n^2 - 2(n-1) - 2n+1$	$n^2 - 2n + 2 - 2n + 1 \neq 0 \quad (I)$	3
II	$n^2 - 2n + 1$	$n^2 - 2n + 1 = 0 \Rightarrow n = 1$ $\Delta = b^2 - 4ac = 4 - 4 = 0 \quad \frac{2 \pm \sqrt{0}}{2} = 1$	
I	$n^2 - 2n + 1 \neq 0$	$n^2 - 2n + 1 \neq 0 \Rightarrow n \neq 1$	4
II	$n^2 - 2n + 1 = 0$	$n^2 - 2n + 1 = 0 \Rightarrow n = 1$	
الف	$ 2n+1 - n+2 \neq 0 \quad 2n+1 \neq n+2 \Rightarrow 2n+1 \neq n+2 \Rightarrow n \neq 1$	$\Delta = b^2 - 4ac \quad 4 - 4 = 0 \quad \frac{2 \pm \sqrt{0}}{2} = 1$ $D_F = \mathbb{R} - \{1, -\frac{1}{3}\}$	4
ب	$ 2n+1 - n+2 \geq 0 \quad 2n+1 \geq n+2 \Rightarrow n \geq 1$	$\Delta = b^2 - 4ac \quad 4 - 4 = 0 \quad \frac{2 \pm \sqrt{0}}{2} = 1$ $D_F = \mathbb{R} - (-\frac{1}{3}, 1]$	4
الف	$1 - \log_2 n > 0 \quad 1 > \log_2 n \quad n > 0$	$n > 0$	5
ب	$1 - \log_2 \frac{n}{2} > 0 \quad 1 > \log_2 \frac{n}{2} \quad \frac{1}{2} < n$	$\frac{1}{2} < n$	

$r_{n-1} > 0, r_n > 1 \quad \left(n > \frac{1}{r} \right) \quad \log_2 \frac{r_n-1}{r} > 0 \quad r_{n-1} > 1 \quad r_n > r \quad n > 1$ $\log_2 \frac{r_{n-1}}{r} \geq 0 \quad \log_2 \frac{r_{n-1}}{r} \leq \left(\frac{1}{r} \right)^0 \quad r_{n-1} \leq \omega \quad r_n \leq r \quad n \leq r$  $D_F = [1, r]$	6
ا) $r \cos \alpha + 1 > 0 \quad r \cos \alpha > -1 \quad \cos \alpha > -\frac{1}{r}$ $D_F = \left(2k\pi + \frac{\sqrt{r^2-1}}{r}, 2k\pi + \frac{\pi}{r} \right)$ ب) $\frac{x-1}{x+1} > 0 \quad \log_2 \frac{x-1}{x+1} \geq 0 \quad \frac{x-1}{x+1} \geq 1 \quad x-1 \geq x+1 \quad D_F = \emptyset$	7
$a < -r \quad a = r \quad -r < a + b \leq 0 \quad -rb \geq -b$ $(-\infty, \frac{b}{r}) \Rightarrow \frac{b}{r} = r \quad b = r$ $a > -r \quad \Delta = a^2 - r(a+r)b \leq 0$ $(a+r)a^2 + a^2 + b \leq 0$ $9a + 11 + r a + b \leq 0 \Rightarrow b \leq -12a - 11$ $a = \frac{-12 \pm \sqrt{144 - 4(1)(-11)}}{2(1)}$ $a = \frac{-12 \pm \sqrt{144 + 44}}{2} = \frac{-12 \pm \sqrt{188}}{2} = \frac{-12 \pm 2\sqrt{47}}{2} = -6 \pm \sqrt{47}$ $a > -r \Rightarrow b \leq \frac{11}{r}$ $a = r \Rightarrow b \leq 6r$	8
$\Delta = r^2 - r(1)(r - r^2) \leq r - 1 \Rightarrow r - r^2 = r - r^2 - r$ $\Delta \leq 0 \quad r - r^2 \leq 0 \quad r - r^2 \leq 0 \quad r^2 \leq 1 \quad -1 \leq r \leq 1$ $1 - (-1) \leq r$	9
$r - r^2 \geq 0 \quad r \geq r^2 \quad -r \leq r \leq r \quad \textcircled{I}$ $n \in \mathbb{Z} \quad [n] + [-n] + 1 = 1 \quad \textcircled{II} \quad n \in \mathbb{Z} \quad [n] + [-n] + 1 = 0 \quad \textcircled{III}$ $I \cup II = \{-2, -1, 0, 1, 2\} \quad \textcircled{IV}$	10