

$$a) y = \frac{x+3}{x^3 + x^2 - 11x + 3} = \frac{x+3}{(x-1)(x-\frac{1}{2})(x+3)} \neq 0$$

$$x^3 + x^2 - 11x + 3 \rightarrow a+b+c+d=0$$

$$\begin{array}{r|l} x^3 + x^2 - 11x + 3 & x-1 \\ \hline -(x^3 - x^2) & \\ \hline 2x^2 - 11x + 3 & \\ -(2x^2 - 2x) & \\ \hline -9x + 3 & \\ -(-9x + 9) & \\ \hline -6 & \end{array}$$

$$x^2 + 2x - 9 = (x+4)(x-1) \Rightarrow x = \frac{-2 \pm \sqrt{4+36}}{2} = \frac{-2 \pm 2\sqrt{10}}{2} = -1 \pm \sqrt{10}$$

$$\Rightarrow D_f = \{R - \sqrt{10}, -1, 1, \sqrt{10}\}$$

$$b) y = \frac{x+3}{x^3 + 9x^2 + 10x + 3} = \frac{x+3}{(x+3)(x+1)(x+\frac{1}{3})} \neq 0$$

$$a+c=b+d \rightarrow x=-1$$

$$\begin{array}{r|l} x^3 + 9x^2 + 10x + 3 & x+1 \\ \hline -(x^3 + x^2) & \\ \hline 8x^2 + 10x + 3 & \\ -(8x^2 + 8x) & \\ \hline 2x + 3 & \\ -(2x + 2) & \\ \hline 1 & \end{array}$$

$$(x+1)(x+4) = x^2 + 5x + 4 \Rightarrow x = \frac{-5 \pm \sqrt{25-4}}{2} = \frac{-5 \pm \sqrt{21}}{2}$$

$$\Rightarrow D_f = \{R - \sqrt{21}, -1, -\frac{1}{3}\}$$

$$a) y = \frac{x+3}{x^3 - x^2 + x - 1} = \frac{x+3}{(x-1)(x^2 - x + 1)} \neq 0$$

$$x^3 - x^2 + x - 1 \rightarrow a+b+c+d=0$$

$$\begin{array}{r|l} x^3 - x^2 + x - 1 & x-1 \\ \hline -(x^3 - x^2) & \\ \hline 0x^2 + x - 1 & \\ -(0x^2 - 0x) & \\ \hline -1 & \end{array}$$

$$\Rightarrow D_f = \{R - \sqrt{5}\}$$

$$b) y = \sqrt{\frac{x+3}{x^3 - x^2 + x - 1}} = \sqrt{\frac{x+3}{(x-1)(x^2 - x + 1)}} \geq 0$$

$$\begin{array}{c|c|c} -3 & 1 & \\ \hline + & - & + \\ \hline 0 & 0 & 0 \end{array}$$

$$\Delta < 0 \rightarrow \text{no real roots}$$

$$\Rightarrow D_f = (-\infty, 1] \cup (1, +\infty)$$

$$y = \frac{x}{x^3 - \omega|x-1| - x + \omega} \neq 0 \rightarrow \frac{x}{x^3 - x + 1 - \omega|x-1| + \omega} = \frac{x}{(x-1)^3 - \omega|x-1| + \omega}$$

$$(x-1)^3 - \omega|x-1| + \omega \rightarrow (|x-1|-1)(|x-1|-\omega) \neq 0$$

$$|x-1| \neq 1 \rightarrow x \neq 0, 2$$

$$|x-1| \neq \omega \rightarrow x \neq 1-\omega, 1+\omega$$

$$\Rightarrow D_f = \{R - \sqrt{1-\omega}, 0, 1, \omega\}$$

$$a) y = \frac{x+3}{|x+1| - |x+3|} \neq 0 \rightarrow |x+1| \neq |x+3|$$

$$\begin{cases} x+1 \neq x+3 \rightarrow x \neq 2 \\ x+1 \neq -(x+3) \rightarrow x \neq -2 \end{cases}$$

$$D_f = \{R - \sqrt{2}, 2\}$$

$$b) y = \sqrt{\frac{|x+1| - |x+3|}{-x+2}} \geq 0 \rightarrow |x+1| \geq |x+3|$$

$$\begin{cases} x+1 \geq x+3 \rightarrow x \geq 2 \\ x+1 \leq -(x+3) \rightarrow x \leq -2 \end{cases}$$

$$\Rightarrow D_f = \{R - (-\frac{2}{\sqrt{2}}, 2)\}$$

$$a) y = \log_2(1 - \log_2^x) \rightarrow x > 0$$

$$1 - \log_2^x > 0 \rightarrow \log_2^x < 1 \rightarrow x < 2 \rightarrow D_f = (0, 2)$$

$$b) y = \log_2(1 - \log_2^{\frac{x}{2}}) \rightarrow x > 0$$

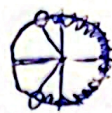
$$1 - \log_2^{\frac{x}{2}} > 0 \rightarrow \log_2^{\frac{x}{2}} < 1 \rightarrow \frac{x}{2} < 2 \rightarrow x < 4 \rightarrow D_f = (\frac{1}{2}, +\infty)$$

$$f(x) = \sqrt{\log_{\frac{1}{2}} \log_2^{(x-1)}} \rightarrow x > 1 \rightarrow x > \frac{1}{2}$$

$$\rightarrow \log_2^{(x-1)} > 0 \rightarrow x-1 > 1 \rightarrow x > 2 \rightarrow x > 1$$

$$\textcircled{1} \cap \textcircled{2} \cap \textcircled{3} \rightarrow D_f = (1, 2]$$

$$\rightarrow \log_{\frac{1}{2}} \log_2^{(x-1)} > 0 \rightarrow \log_2^{(x-1)} \leq 1 \rightarrow x-1 \leq 2 \rightarrow x \leq 3 \rightarrow x \leq 2$$

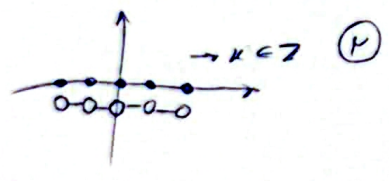
ا) $y = \log(r \cos x + 1) \rightarrow r \cos x + 1 > 0 \rightarrow \cos x > -\frac{1}{r}$  $\rightarrow D_f = (r \cos x - \frac{r}{r}, r \cos x + \frac{r}{r})$ سوال 1

ب) $y = \sqrt{\log \frac{x-1}{x+1}} \rightarrow \frac{x-1}{x+1} > 0$ $\frac{-1}{0} \frac{1}{0}$ $\log \frac{x-1}{x+1} \geq 0 \rightarrow \frac{x-1}{x+1} \geq 1 \rightarrow \frac{x-1-x-1}{x+1} \geq 0 \rightarrow \frac{-2}{0} \rightarrow D_f = (-\infty, -1)$

$f(x) = \sqrt{(a+x)x^2 + ax + b} \rightarrow D_f = (-\infty, \infty)$
 $a+x=0 \rightarrow a=-x$ $-rx+b=0 \xrightarrow{x=r} -r+b=0 \rightarrow b=r$

$f(x) = \sqrt{x^2 + rx + r - m^2} \rightarrow D_f = \mathbb{R} \rightarrow a > 0$
 $\Delta \leq 0 \rightarrow r - r(r - m^2) \leq 0 \rightarrow r - r + rm^2 \leq 0$
 $1 - (-1) = 2$ $r(m-1)(m+1) \leq 0$ $\frac{-1}{0} \frac{1}{0}$ سوال 2

$f(x) = \frac{\sqrt{r-x^2}}{[x] + [-x] + 1} \geq 0 \rightarrow \frac{-r}{0} \frac{r}{0}$ ①
 $\frac{1}{1} \neq -1$ سوال 3



① ∩ ② = $D_f = \{-2, -1, 0, 1, 2\}$