۱- الف) $y=\dfrac{x+3}{2x^3+3x^2-8x+3}=\dfrac{x+3}{(x-1)(2x^2+5x-3)}=\dfrac{x+3}{(x-1)(2x-1)(x+3)}\Rightarrow D_y=\mathbb{R}-\{1,\frac{1}{2},-3\}$

ب) $y=\dfrac{x+3}{2x^3+9x^2+10x+3}=\dfrac{x+3}{(x+1)(2x^2+7x+3)}=\dfrac{x+3}{(x+1)(x+3)(2x+1)}\Rightarrow D_y=\mathbb{R}-\{-1,-3,-\frac{1}{2}\}$

۲- الف) $y=\dfrac{x+3}{x^3-2x^2+2x-1}=\dfrac{x+3}{(x-1)\underbrace{(x^2-x+1)}_{\Delta<0,\ a>0\ \Rightarrow\ +\ \text{همواره}}}\Rightarrow x-1\neq 0\Rightarrow x\neq 1\Rightarrow D_y=\mathbb{R}-\{1\}$

ب) $y=\sqrt{\dfrac{x+3}{x^3-2x^2+2x-1}}=\sqrt{\dfrac{x+3}{(x-1)\underbrace{(x^2-x+1)}_{\Delta<0,\ a>0\ \Rightarrow\ +\ \text{همواره}}}}$

$\dfrac{x+3}{(x-1)(x^2-x+1)}\geq 0$

$\Rightarrow$ (-3, 1: + | - | +) $\Rightarrow D_y=(-\infty,-3]\cup(1,+\infty)$

۳- $y=\dfrac{2}{x^2-5|x-1|-2x+5}$

$x^2-5|x-1|-2x+5\neq 0$

$x^2-5|x-1|-2x+5=(x^2-2x+1)-5|x-1|+4=(x-1)^2-5|x-1|+4$

$\Rightarrow |x-1|^2-5|x-1|+4\neq 0\Rightarrow (|x-1|-4)(|x-1|-1)\neq 0\Rightarrow$

$|x-1|\neq 1$: $x-1\neq 1\Rightarrow x\neq 2$ ، $x-1\neq -1\Rightarrow x\neq 0$

$|x-1|\neq 4$: $x-1\neq 4\Rightarrow x\neq 5$ ، $x-1\neq -4\Rightarrow x\neq -3$

$\Rightarrow D_y=\mathbb{R}-\{-3,0,2,5\}$

۴- الف) $y=\dfrac{x+3}{|2x+1|-|x+3|}\Rightarrow |2x+1|-|x+3|\neq 0\Rightarrow |2x+1|\neq|x+3|\Rightarrow (2x+1)^2\neq(x+3)^2$

$\Rightarrow 4x^2+4x+1\neq x^2+6x+9\Rightarrow 3x^2-2x-8\neq 0$ ([illegible])

$x^2-2x-24=(x-6)(x+4)\Rightarrow\ =(x-2)(3x+4)\neq 0$

$\Rightarrow D_f=\mathbb{R}-\{2,-\frac{4}{3}\}$

ب) $y=\sqrt{|2x+1|-|x+3|}\Rightarrow |2x+1|-|x+3|\geq 0\Rightarrow |2x+1|\geq|x+3|\Rightarrow (2x+1)^2\geq(x+3)^2$

$\Rightarrow 4x^2+4x+1\geq x^2+6x+9\Rightarrow 3x^2-2x-8\geq 0$ «طبق قسمت الف» $(x-2)(3x+4)\geq 0$

($-\frac{4}{3}$, 2: + | - | +) $\Rightarrow D_y=\mathbb{R}-(-\frac{4}{3},2)$

۵- الف) $y=\log_2(1-\log_3 x)\rightarrow 1-\log_3 x>0\Rightarrow \log_3 x<1\Rightarrow x<3^1$ ، $x>0$ $\Rightarrow D_y=(0,3)$

ب) $y=\log_2(1-\log_{\frac{1}{2}} x)\rightarrow 1-\log_{\frac{1}{2}} x>0\Rightarrow \log_{\frac{1}{2}} x<1\Rightarrow x>(\frac{1}{2})^1$ ، $x>0$ $\Rightarrow D_y=(\frac{1}{2},+\infty)$

$6-\ f(x)=\sqrt{\log_{0.5}\log_{5}^{(2x-1)}}$

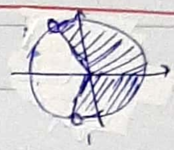
$2x-1>0 \Rightarrow 2x>1 \Rightarrow x>\frac{1}{2}$

$\log_{5}^{(2x-1)}>0 \Rightarrow 2x-1>5^{0} \Rightarrow 2x>2 \Rightarrow x>1$

$\log_{0.5}\log_{5}^{(2x-1)}\geq 0 \Rightarrow \log_{5}^{(2x-1)}\leq 0.5^{0} \Rightarrow 2x-1\leq 5 \Rightarrow 2x\leq 6 \Rightarrow x\leq 3$

$\Rightarrow D_f=(1,3]$

$7-$ الف) $y=\log(2\cos x+1) \Rightarrow 2\cos x+1>0 \Rightarrow 2\cos x>-1 \Rightarrow \cos x>-\frac{1}{2}$



$\Rightarrow D_f=\mathbb{R}-\left[2k\pi+\frac{2\pi}{3},\ 2k\pi+\frac{4\pi}{3}\right]$

ب) $y=\sqrt{\log\frac{x-1}{x+1}} \Rightarrow \log\frac{x-1}{x+1}\geq 0 \Rightarrow \frac{x-1}{x+1}\geq 1 \Rightarrow \frac{x-1}{x+1}-1\geq 0 \Rightarrow \frac{x-1-x-1}{x+1}\geq 0 \Rightarrow \frac{-2}{x+1}\geq 0 \Rightarrow x<-1$

$\frac{x-1}{x+1}>0 \Rightarrow \begin{array}{ccc} -1 & & 1 \\ + & \emptyset\ - & + \end{array} \Rightarrow x\in(-\infty,-1)\cup(1,+\infty) \xRightarrow{\cap} D_f=(-\infty,-1)$

$8-\ f(x)=\sqrt{(a+2)x^2+ax+b}$ $\quad D_f=(-\infty,3] \Rightarrow \begin{array}{cc} & 3 \\ + & \emptyset\ - \end{array}$ ⇐ یک ریشه ی ساده ⇐ درجه یک بوده ①

$\hookrightarrow \alpha(-x+3)$

$(a+2)x^2+ax+b\geq 0$ ②

① $\Rightarrow a+2=0 \Rightarrow a=-2$

$\Rightarrow -2x+b\geq 0 \xrightarrow{\alpha(-x+3)} \boxed{b=6}$

$9-\ f(x)=\sqrt{x^2+2x+2-m^2}$ $\quad D_f=\mathbb{R}$ $\Downarrow$ + دائماً

$x^2+2x+2-m^2\geq 0 \Rightarrow \begin{cases} a>0 \ ✓\ a=1 \\ \Delta\leq 0 \rightarrow b^2-4ac\leq 0 \Rightarrow \end{cases}$

$\Delta\leq 0 \Rightarrow b^2-4ac\leq 0 \Rightarrow 4-4(2-m^2)\leq 0 \Rightarrow 4-8+4m^2\leq 0 \Rightarrow 4m^2-4\leq 0 \Rightarrow m^2\leq 1 \Rightarrow -1\leq m\leq 1$

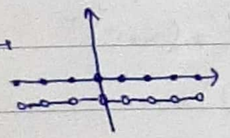
$\Rightarrow \boxed{\max_m-\min_m=1-(-1)=2}$

$10-\ f(x)=\frac{\sqrt{4-x^2}}{[x]+[-x]+1}$

$4-x^2\geq 0 \Rightarrow x^2\leq 4 \Rightarrow -2\leq x\leq 2$

$[x]+[-x]$

$\hookrightarrow$



$\Rightarrow \xrightarrow{x\in\mathbb{Z}} [x]+[-x]=0$

$\Rightarrow D_f=\{x \mid x\in\mathbb{Z},\ -2\leq x\leq 2\}$

$\Rightarrow \{-2,-1,0,1,2\}$

$\hookrightarrow$ ۵ تا