

الف)  $\frac{x^2 - 2x + 1 - x^2}{x(x-1)} = \frac{1-2x}{x(x-1)} > 0$   $\frac{1}{x} - \frac{2}{x-1} > 0 \Rightarrow D_f = (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب)  $\frac{x-2x-2}{x(x+1)} = \frac{-x-2}{x(x+1)}$   $\frac{x+2}{x(x+1)} > 0$   $\rightarrow x \neq \{-2, -1, 0, 1\}$   $\Rightarrow D_f = \mathbb{R} - \{-2, -\frac{5}{4}, -1, 0, 1\}$

الف)  $\left(\frac{1}{x}\right)^n - 9 > 0 \Rightarrow \left(\frac{1}{x}\right)^n > 9 \Rightarrow \frac{1}{x^n} > 9 \Rightarrow x^n < \frac{1}{9}$   $\Rightarrow D_f = \mathbb{R} - (-2, 2/5)$

ب)  $\sqrt{y+1} = 3 - \sqrt{x-1}$   $\Rightarrow \sqrt{x-1} \geq 0 \Rightarrow x \geq 1$   $\Rightarrow D_f = [1, 14]$

$x^2 - x - 2 < 0 \Rightarrow (x+1)(x-2) < 0 \Rightarrow (-\infty, -1) \cup (2, +\infty)$   $\Rightarrow D_f = (-\infty, -1) \cup (2, +\infty)$

$x^2 - 1 > 0 \Rightarrow (x-1)(x+1) > 0 \Rightarrow \mathbb{R} - (1, -1)$

$-(x^2 - 9x - 3) = -(x+1)(x-b) \Rightarrow -2b = -3 \Rightarrow b = 1/2$   $\Rightarrow D_f = [-3, +\infty)$

$f\left(\frac{\sqrt{x}}{x} + \frac{1}{x}\right) = f\left(\frac{\sqrt{x}+1}{x}\right) = f\left(\frac{1+\sqrt{x}}{x}\right) = \frac{1+\sqrt{x}}{x} = \frac{1}{x} + \frac{\sqrt{x}}{x} = \frac{1}{x} + \frac{1}{\sqrt{x}}$

$f\left(\frac{a+1}{a-1}\right) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{a+1+a-1}{a-1}}{\frac{a+1-a+1}{a-1}} = \frac{2a}{2} = a$   $\Rightarrow a \in \mathbb{R}$

$f(g(a)) \xrightarrow{g(a)=t} t^2 - ft - f \Rightarrow t^2 - ft + f \geq 0 \Rightarrow t = 2 \Rightarrow \sqrt{a^2 - 1} = 2$   $\Rightarrow a^2 - 1 = 4 \Rightarrow a^2 = 5 \Rightarrow a = \pm\sqrt{5}$

$\cos^2 x + 2 \cos x - 3/4 = 0 \Rightarrow \cos^2 x + 2 \cos x - 1.5 = 0$   $\Rightarrow \cos x = \frac{-2 \pm \sqrt{4 - 4(-1.5)}}{2} = \frac{-2 \pm \sqrt{10}}{2}$   $\Rightarrow \cos x = \frac{-2 + \sqrt{10}}{2}$   $\Rightarrow \cos x = \frac{-2 + \sqrt{10}}{2}$

الف)  $f(1+3) = f(4) = 1 - 4 + 6 = 3$   $f(-2) = f(-2+2) = 3 + 2 + 6 = 11$

الف)  $\frac{x^2 - 2x + 1 - x^2}{x(n-1)} = \frac{1-2x}{x(n-1)} > 0 \Rightarrow \frac{0}{+} \frac{1}{-} \frac{1}{+} \frac{1}{-} \Rightarrow D_f = (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب)  $\frac{x - 2x - 2}{x(n+1)} \cdot \frac{2x+4+x-1}{(n-1)(n+2)} \rightarrow \left. \begin{array}{l} x \neq \{-2, -1, 0, 1\} \\ x+\frac{5}{2} \neq 0 \Rightarrow x \neq -\frac{5}{2} \end{array} \right\} \Rightarrow D_f = \mathbb{R} - \{-2, -\frac{5}{2}, -1, 0, 1\}$

الف)  $\left(\left(\frac{1}{x}\right)^n - 9\right) \left(22 - \frac{1}{x}\right) > 0 \Rightarrow \frac{-2}{+} \frac{2/5}{-} \frac{1/5}{+} \Rightarrow D_f = \mathbb{R} - (-2, 2/5)$

ب)  $\sqrt{y+1} = 2 - \sqrt{x-1} \Rightarrow \left. \begin{array}{l} \sqrt{x-1} > 0 \Rightarrow x > 1 \\ \sqrt{x-1} \leq 2 \Rightarrow x-1 \leq 4 \Rightarrow x \leq 5 \end{array} \right\} \Rightarrow D_f = [1, 5]$

$x^2 - x - 2 : (x+1)/(x-2) > 0 \rightarrow (-\infty, -1) \cup (2, +\infty)$   
 $x^2 - 1 > 0 \Rightarrow (x-1)/(x+1) > 0 \rightarrow \mathbb{R} - (1, -1)$   
 $D_f = (-\infty, -1) \cup (2, +\infty)$

$-(x^2 - ax - 3) = -(x+2)/(x-b) \Rightarrow -2b = -3 \Rightarrow b = 1/2$   
 $\hookrightarrow 2-b = -a = 2-1/2 = -a \Rightarrow a = -3/2$   
 $a+b = 1$

$f(x) = x \Rightarrow \left. \begin{array}{l} 2x-2 \geq 0 \Rightarrow x \geq 1 \Rightarrow 2/(x-1) \geq 0 \Rightarrow x \geq 1 \\ x+3 \leq 0 \Rightarrow x \leq -3 \end{array} \right\} \Rightarrow D_f = [-3, +\infty)$

$f\left(\frac{\sqrt{x}}{2} + \frac{1}{2}\right), f\left(\frac{\sqrt{x}+1}{2}\right) = \frac{1}{2} \left(\frac{\sqrt{x}+1}{2}\right) = \frac{\sqrt{x}+1}{4} = \frac{\sqrt{x}+1}{2} \cdot \frac{1}{2} = \frac{1}{2} \cdot \frac{1}{2}$

$f\left(\frac{a+1}{a-1}\right) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{a+1+a-1}{a-1}}{\frac{a+1-a+1}{a-1}} = \frac{2a}{2} = a \Rightarrow a \in \mathbb{R} - \{1\}$

$f(g(x)) \xrightarrow{g(x)=t} t^2 - t^2 t - t \Rightarrow t^2 - t^2 t + t \Rightarrow t = 2 \Rightarrow \sqrt{a^2 - 1} = 2$   
 $a^2 - 1 = 4 \Rightarrow a^2 = 5 \Rightarrow a = \pm \sqrt{5}$

$\cos^2 x + \Delta \cos x - 3/4 = 0 \Rightarrow \cos^2 x + \Delta \cos x - 1/4$   
 $\cos x = \frac{1}{2} \checkmark \Rightarrow \tan x = \frac{3}{4} = f(4/5)$   
 $\cos x = \frac{3}{4} \checkmark \Rightarrow \tan x = \frac{4}{3} = f(3/4)$   
 $\cos x = \frac{4}{5} \checkmark \Rightarrow \tan x = \frac{3}{4} = f(4/5)$   
 $\cos x = \frac{3}{5} \checkmark \Rightarrow \tan x = \frac{4}{3} = f(3/4)$

110  $f(1+3) = f(4) = 1 - 4 + 9 = 2$   
 $f(-2) = f(-2+3) = 3 + 4 - 9 = -2$