

$$y = \sqrt{f(x) - x + 1}$$

$$f(x) = \begin{cases} x-1 : [x] \geq 1 & x \geq 1 \rightarrow y = \sqrt{x-1-x+1} = \sqrt{x} \rightarrow x \geq 0 \\ x+1 : [x] \leq 1 & x < 1 \rightarrow y = \sqrt{x+1-x+1} = \sqrt{x+1} \rightarrow x+1 \geq 0 \rightarrow x \geq -1 \end{cases}$$

$$y = \frac{x^2 x^2 + 2x x^2 + 1x + 1}{(x^2 + x + 1)^2} = \frac{x^2 + 1x + 1}{(x^2 + x + 1)^2} = \frac{(x+1)}{(x^2 + x + 1)^2} = \frac{1}{x^2 + x + 1}$$

$$\rightarrow \text{Residue} = -\frac{1}{4}$$

$$\rightarrow D_f = \mathbb{R} - \left\{ -\frac{1}{4} \right\}$$

$$f(z) = \begin{cases} \frac{z^2 + \gamma z - z^{-2}}{z^2 - 1} & : z \neq \pm 1 \\ \frac{\alpha z + \gamma}{z + b} & : z = \pm 1 \end{cases}$$

$$f(z) = \frac{z+1}{z-c} \quad f(z) = g(z) \Rightarrow D_{f(z)} = D_{g(z)} \quad \begin{matrix} b=c \\ a=-c-1 \end{matrix}$$

$$g(z) = \frac{z+1}{z^2+az+b} \Rightarrow \frac{(z+1)(z-1)}{(z-1)(z-c)} = \frac{z+1}{z^2-(a+1)z+c}$$

$$c=1, b=1, a=-2 \quad Dg \neq 1, c \text{ and } Df \neq c \Rightarrow \boxed{c=1}$$

$$a+b+c = 1+1-2 = 0$$

$$f(z) = (z-2)^2(z-1)$$
$$g(z) = f(z+1) + f(1-z) = (z-1)^2(z) + (-1+z)^2(-z)$$
$$= z(\cancel{z^2 - \cancel{2z} + 1} - \cancel{z^2 - \cancel{2z} + 1}) \Rightarrow g(z) = -\boxed{\wedge z^5}$$

$f(1-\sqrt{2}) = \begin{cases} \sqrt{2}+2 & x \leq 0 \\ \sqrt{2} & x > 0 \end{cases}$ $f(-1) + f(\sqrt{2}) =$ $\Downarrow \quad \Downarrow$ $\sqrt{2} + \sqrt{-1} + 2 = \boxed{5}$	$f(1) = f(1-\sqrt{2})$ $-1 = 1-\sqrt{2}$ $\sqrt{2} = 2$ $1 = 2$ $f(\sqrt{2}) = f(1-\sqrt{2})$ $\sqrt{2} = 1-\sqrt{2}$ $-\sqrt{2} = \sqrt{2} \Rightarrow \underline{\underline{x = -1}}$
$f(x+\sqrt{2}) = x^2 + \sqrt{2}$ $x + \sqrt{2} = 4$ $x + \sqrt{2} - 4 = 0 \xrightarrow{\sqrt{2}=t} t^2 + t - 4 = 0$ $(t+\sqrt{2})(t-\sqrt{2}) \Rightarrow t = \begin{cases} \sqrt{2} = \sqrt{2} \checkmark \Rightarrow x = 2 \\ \sqrt{2} = -\sqrt{2} \end{cases}$	$f(4) = ? = (\sqrt{2})^2 + \sqrt{2} = 2 + \sqrt{2} = \boxed{2 + \sqrt{2}}$
$f(x) = x^2 + x$ $f(x-1) + f(1-x) = (x-1)^2 + (x-1) + -(x-1)^2 + (1-x)$ $= \boxed{0}$	
$f(x) = \sqrt{x^2 - 4a} + k - 1$ $g(x) = \sqrt{b - 4x} + k$ $D_f = \{x^2 - 4a \geq 0, x \geq \frac{4a}{4}\}$ $D_g = \{b - 4x \geq 0, x \leq \frac{b}{4}\}$ $f-g(1) = 2\sqrt{x^2 - 4a} + 2k - 2 - \sqrt{b - 4x} - 2k = k \Rightarrow 2\sqrt{x^2 - 4a} + 2k - 2 = \sqrt{b - 4x} + 2k$ $2k - 2 = \sqrt{b - 4x} \Rightarrow 2k = \sqrt{b - 4x} + 2 \Rightarrow k = \frac{\sqrt{b - 4x} + 2}{2}$	$f-g = \{(1, k)\}$ $4a - \frac{b}{4} - k = 4 - 2 + 1 = 3$ $b = 4$ $a = \frac{4}{4} = 1$
$f(x) = \sqrt{m-x} + n, x \leq m$ $g(x) = \sqrt{x+2}, x \geq -1$ $D_{g \cap f} = [-1, V] = D_f \cap D_g \Rightarrow m = V$ $f-g(x) = 4\sqrt{x}$ $\sqrt{V-x} + n - \sqrt{2} = 2 + n - 2\sqrt{x} = 4\sqrt{x} \Rightarrow 2 + n = 6\sqrt{x} \Rightarrow n = 6\sqrt{x} - 2$	$-1 \leq x \leq m$ $m+n = V + 6\sqrt{x-2} = 6\sqrt{x-2}$