

$$\sin \frac{\pi}{4} = \sin \varphi_1 = \frac{\sqrt{2}}{2} \quad f\left(\frac{\sqrt{2}}{2} + 1\right) = 2\left(\frac{\sqrt{2}}{2} + 1\right)\left(\frac{\sqrt{2}}{2} + 1 - 2\right) = 2\left(\frac{\sqrt{2}}{2} + 1\right)\left(\frac{\sqrt{2}}{2} - 1\right)$$

$$\cos \frac{\pi}{4} = \cos \varphi_1 = 1 \Rightarrow f\left(\frac{\sqrt{2}}{2} + 1\right) = 2\left(\frac{\sqrt{2}}{2} - 1\right) = 2\left(-\frac{1}{2}\right) = \boxed{-1}$$

$$f\left(\frac{\sqrt{2}}{2} + 1\right) = ?$$

$$f(x) = 2x^2 - 4x \Rightarrow f(x) = 2(x^2 - 2x) \Rightarrow f(x) = 2(x - 2)x = 2x(x - 2)$$

$$f(f(a)) = a \Rightarrow f(a) = \frac{a+1}{a-1}$$

$$\frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = a \Rightarrow \frac{a+1+a-1}{a+1-a+1} = \frac{2a}{2} = a \Rightarrow a = a$$

$$a \in \mathbb{R} \setminus \{1\}$$

دایره ی هکدری همان عدد را به ما می دهد
چون 1 که خارج را تقسیم نموده می کند

$$f(x) = x^2 - 4x \quad g(x) = \sqrt{x^2 - 1} \quad f(g(a)) = -4$$

$$f(x) = -4 \Rightarrow x^2 - 4x = -4 \Rightarrow x^2 - 4x + 4 = 0 \Rightarrow (x - 2)^2 = 0 \Rightarrow x = 2$$

$$g(a) = 2 \Rightarrow \sqrt{a^2 - 1} = 2 \Rightarrow a^2 - 1 = 4 \Rightarrow a^2 = 5 \Rightarrow \boxed{a = \pm \sqrt{5}}$$

$$f(x+c) = x^2 - ax + b$$

$$x+c = 4 \quad f(1+c) = 1^2 - a + b = 2 = f(4)$$

$$x+c = -2 \quad f(-4+c) = (-4)^2 + c + b = 16 + c + b = 2 = f(-2)$$

$$f(4) \times f(-2) = 2 \times 2 = 4$$



$$\alpha = \frac{\pi}{4} \dots \frac{3\pi}{4}$$

$$\tan \frac{\pi}{4} = -\sqrt{3}, \tan \frac{3\pi}{4} = \sqrt{3}$$

$$(\sqrt{3})^2 = 3, (-\sqrt{3})^2 = 3$$

$$f(\cos \alpha + 1 \cos \alpha) = \tan^2 \alpha$$

$$f(\cos \alpha + 1 \cos \alpha) = 0 = \frac{0}{1} \Rightarrow 1 \cos^2 \alpha + 1 \cos \alpha - 0 = 0$$

$$\Rightarrow \cos^2 \alpha + 1 \cos \alpha - 0 = 0$$

$$\Rightarrow (\cos \alpha - 1)(\cos \alpha + 1) = 0$$

زیرا $\cos \alpha$ کوچک تر از اینست $\rightarrow -\frac{1}{2} \times \frac{1}{2}$