

$$a) f(x) = \sqrt{\frac{(x+1)^2 - x^2}{x(x-1)}} \sim \frac{1-2x^2}{x(x-1)} \geq 0$$

(1)

$$\begin{array}{c} 0 & k & 1 \\ + & - & + \\ \hline \end{array} \sim Df = (-\infty, 0) \cup [k, 1)$$

$$b) \frac{1}{n+1} - \frac{1}{n} = \frac{n - (n+1)}{n(n+1)} = \frac{-n-1}{n(n+1)} \sim \begin{matrix} n \neq 0 \\ n+1 \neq 0 \end{matrix}$$

$$\frac{1}{n-1} + \frac{1}{n+1} = \frac{(n+1) + (n-1)}{(n-1)(n+1)} \Rightarrow Df \subset \mathbb{R} = \left\{ -1, -\frac{1}{2}, -1, 0, 1 \right\}$$

$$n+1 \neq 0, n-1 \neq 0$$

(2)

$$a) \Rightarrow \left(\left(\frac{1}{p}\right)^n - 9\right)(x^2 - x^n) \geq 0$$

$$\sim Df = (-\infty, -1] \cup \left[\frac{9}{4}, +\infty\right)$$

$$\left(\frac{1}{p}\right)^n = 9 \Rightarrow n = -1$$

$$x^2 = 9 \Rightarrow x = \frac{3}{p}$$

$$\frac{-1}{+1-1+}$$

$$b) \textcircled{1} \sim n-1 \geq 0 \Rightarrow n \geq 1$$

$$\sqrt{y+1} \geq 1 - \sqrt{x-1} \geq 1 + \sqrt{x-1} \geq 0 \Rightarrow$$

$$\sqrt{x-1} \leq 1 \sim x-1 \leq 1$$

$$\textcircled{1} \wedge \textcircled{2} \sim Df = [1, 1]$$

$$x, y \in \mathbb{R}$$

$$\textcircled{1} \quad \frac{-1 \pm \sqrt{1+4}}{1+1+1}$$

$$(n-1)(n+1) > 0 \leadsto$$

$$\textcircled{1} \cap \textcircled{2} \leadsto D_f = (-\infty, -1) \cup$$

$$\textcircled{2} \leadsto \frac{n^2-1}{(n-1)(n+1)} > 0 \leadsto \frac{-1 \pm \sqrt{1+4}}{1+1+1}$$

$$(1, +\infty)$$

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$$f(x) = \sqrt{x^2 + ax - n^2} \leadsto x^2 + ax - n^2 \geq 0$$

$$\frac{c}{a} = \frac{b_2 - b_1}{a_2 - a_1} = -3 = \frac{bx - 1 - (-2)}{x - 1 - (-1)} \quad b = \frac{3}{2}$$

$$a + b = \frac{3}{2} - \frac{1}{2} = 1$$

$$\text{لذلك } \frac{c}{a} = \frac{-b}{a} = a = -1 + \frac{3}{2} = -\frac{1}{2} = a$$

$$f(x) - x \geq 0$$

$$1) \quad x \geq 1 \leadsto x^2 - 1 - x \geq 0 \leadsto x^2 > 1 \leadsto [1, +\infty)$$

$$x \geq 1$$

$$2) \quad x < 1 \leadsto x^2 + 1 - x \geq 0 \leadsto x \geq -1 \Rightarrow [-1, 1)$$

$$1 \cup 2 \leadsto D_f = [-1, +\infty)$$

$$\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2} \quad \left\{ \begin{array}{l} \sin \frac{\pi}{4} + \cos \frac{\pi}{4} = 1 + \frac{\sqrt{2}}{2} \\ \cos \frac{\pi}{4} = 1 \end{array} \right.$$

$$\cos \frac{\pi}{4} = 1$$

$$f(x) = x^2 - 6x \leadsto x \left(1 + \frac{\sqrt{2}}{2} \right)^2 = 6 \left(1 + \frac{\sqrt{2}}{2} \right) = \frac{6}{2} + 3\sqrt{2} = 3 + 3\sqrt{2}$$

$$x \left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} \right)$$

$$-\frac{1}{4}$$

$$f(f(a)) = a$$

$$P_f = R - f$$

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$$f(f(a)) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{a+1+a-1}{a-1-a+1} = \frac{2a}{-2} = -a$$

$$f(x) = x^2 - 5x \quad g(x) = x$$

$$g(x) = \sqrt{x^2 - 1}$$

$$f(g(x)) = x^2 - 5x = (x-2)^2 - 1 = x^2 - 4x + 4 - 1 = x^2 - 4x + 3$$

$$f(g(x)) = x^2 - 5x$$

$$g(x) = \sqrt{x^2 - 1} \Rightarrow x^2 - 1 = a^2 \Rightarrow x = \pm \sqrt{a^2 + 1}$$

$$f(x+3) = x^2 - 2x + 4$$

$$f(x)f(-x)$$

$$x=1 \Rightarrow f(1) = 1 - 2 + 4 = 3$$

$$x=-4 \Rightarrow f(-4) = 16 + 8 + 4 = 28$$

$$x \times \sqrt{x} = 16 \times 4$$

1.

$$f(\cos^n x + 2 \cos x) \tan^n x$$

$$\cos^n x = \cos^n x$$

$$f(r, \theta) \Rightarrow r \cos^n \theta + 2 \cos \theta = \frac{1}{r} \Rightarrow r \cos^n \theta + 2 \cos \theta = \frac{1}{r}$$

$$x = r \cos \theta \Rightarrow r \cos^n \theta + 2 \cos \theta = \frac{1}{r}$$

$$\cos^n x = \frac{1}{r} \Rightarrow x = \cos^{-1} \left(\frac{1}{r} \right) \Rightarrow r = \frac{1}{\cos^n x} \Rightarrow r = \sec^n x$$

$$(t-1)(t+1) = 0$$

$$t = \frac{1}{x} \Rightarrow \cos x$$

$$t = -\frac{1}{x} \Rightarrow -\frac{1}{x} = \cos x \Rightarrow \cos x = -\frac{1}{x}$$